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MILITARY

MSDF PILOTS TO FERRY THREE P-3C'S TO JAPAN

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 p 8

[Text]

Japan's first three Lockheed P-3C antisubmarine patrol aircraft will be ferried from the United States to Japan in late December by 51 crewmen of the Maritime Self-Defense Force (MSDF) with their training in the United States completed.

They will leave the U.S. Navy's Jacksonville Base in Florida Dec. 21 and arrive at the MSDF's Atsugi Air Base Dec. 25 via Midway and other points. They will immediately enter service for the 51st Air Squadron at the base.

The three P-3Cs are included in the first eight aircraft ordered in FY 1978. The MSDF ordered the three planes from Lockheed Corp. through the U.S. Navy under the U.S. Foreign Military Sales (FMS) system and the remaining five from Kawasaki Heavy Industries Ltd., which undertakes P-3C production under Lockheed license.

The MSDF intends to procure a total of 45 P-3Cs in the immediate future. Following the first eight aircraft, ten were ordered in FY 1980.

The service took delivery of the first three P-3Cs last April, June and July at Lockheed's Burbank plant. They have so far been used for training MSDF P-3C crewmen at the Jacksonville Base.

The MSDF's three-year training of P-3C crewmen and maintenance men in the United States is to end with the 51 crewmen's return aboard the three P-3Cs.

The training in the United States has covered about 230 MSDF men -- about 60 software engineers, 50 pilots, about 110 maintenance men and eight coordinators.

Trainees other than the 51 men have gradually returned home since June to prepare for domestic training.

CSO: 4120/102

MAJOR MSDF SHIPBUILDING PROGRAMS REPORTED

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 pp 8, 9

[Text]

The MSDF plans to order a large number of destroyers under the FY 1983-87 Medium-Term Defense Program (MTDP) to achieve a target inventory of about 60 ships stipulated in the October 1976 National Defense Program Outline.

Its current inventory of antisubmarine surface ships comprises about 55 ships. But around three ships are expected to be retired every year.

The 60-ship target consists of 32 ships for four escort flotillas for sea lane defense and 28 ships for five regional fleets for coastal defense. One escort flotilla is made up of one 4,700-ton DDH helicopter-mounted destroyer, two 4,500-ton DDG guided-missile destroyers and five 2,900-ton DD gas-turbine-powered destroyers. Three helicopters are mounted on a DDH and one on a DD. Destroyers for regional fleets are small 1,400-ton DE models.

So far, all the four necessary DDHs have been built. Of the eight DDGs, three are already in service and two have been funded. Thus three DDGs are left for the FY 1983-87 MTDP, which is now under preparation. Of the 20 necessary DDs, nine were funded between FY 1977 and 1981. If four DDs are approved in FY 1982 as requested, seven would be left for the new MTDP.

For shipbuilders, the Defense Agency has traditionally ordered DDHs from Ishikawajima-Harima Heavy Industries Co. (IHI) and DDGs from Mitsubishi Heavy Industries Ltd (MHI). DD builders are the two firms, Sumitomo Heavy Industries Ltd. (SHI), Hitachi Shipbuilding & Engineering Co. and Mitsui Engineering & Shipbuilding Co. Of the seven DDs funded between FY 1977 and 1980, two each were ordered from SHI and IHI, and one each from Hitachi, MHI and Mitsui.

Under the FY 1981 budget, one DDG and two DDs are funded. Although MHI is certain to gain the DDG order, IHI, Hitachi and SHI are competing for the two DD orders.

For FY 1982, the MSDF has requested funding of five destroyers -- four DDs and one DE. If all the five are approved, one each could be ordered from the five destroyer builders.

As for submarines, orders have so far been awarded only to MHI and Kawasaki Heavy Industries Ltd. (KHI). Although KHI has been given no destroyer orders, it has monopolized contracts for gas turbine engines powering DDs and DEs since FY 1977. KHI is also to receive a gas turbine contract for a DDG funded in FY 1981.

CSO: 4120/102

ECONOMIC

JAPAN AUTOMAKERS REVAMPING BUSINESS STRATEGY

OW300955 Tokyo KYODO in English 0823 GMT 30 Dec 81

[Article by Susumu Hiyama]

[Text] Tokyo Dec 30 KYODO--Japanese car makers are revamping their business strategy now that years of uninterrupted export-led growth have come to an end.

New short-range plans call for greater emphasis on domestic sales and downplay exports to traditional markets like the United States and Western Europe.

To make up for the slack in exports in the longer term, they now plan to invest in facilities overseas to assemble cars close to where the products can be marketed.

The shift in policy has emerged after a close analysis of past export performances and future trends in the overseas markets where protectionism is persistent amid a protracted business slump and soaring unemployment.

Final 1981 figures are yet to be announced, but preliminary counts show that exports of passenger cars in the year virtually levelled off at the 1980 total of 3.95 million units, ending the past trend often marked by two-digit annual growth rates.

"You just can't go on exporting fully assembled cars for good," cautioned Takashi Ishihara, president of Nissan Motor, in a published interview.

"Our models may be better in quality, more competitive in price and will find more users abroad. But this doesn't mean that our exports are without problems."

Statistics tell how heavily the Japanese motor industry has relied on exports for its phenomenal growth.

While the industry's production (including buses and trucks) grew by 65 percent between 1975 and 1980, exports jumped by 139.2 percent from 2.68 million units to 5.97 million units. In the same period, domestic sales increased only 16.5 percent from 4.3 million units to 5 million units. As a result, the ratio of exports to production climbed to 56 percent from 39 percent in 1975.

The brilliant performance drew sharp criticisms, particularly in the United States, leading eventually to the Japanese agreement last May to put voluntary curbs on car shipments over three years to 1983.

Soon afterwards car producers were persuaded into accepting similar self-restraint arrangements with Canada, West Germany and the Benelux countries of Belgium, the Netherlands and Luxembourg.

These were in addition to the so-called "gentlemen's agreement" holding car sales in Britain to less than 11 percent of the market, and the official quotas limited sales to less than 3 percent of the market in France and 2,000 units a year in Italy.

What all this means is Japanese cars are now placed under "managed trade" in nine major markets, which, combined, took just under 70 percent of total Japanese vehicle exports in 1980.

Initial impact of this is already clear. For four months running up to November, the last month for which official figures are available. Japanese car exports were down on the previous year's levels by up to 11 percent--something the industry had not experienced since 1974, the year immediately after the first global oil crisis.

Domestic sales in 1981 were equally dull.

Preliminary tabulations put the year's home sales somewhere around 3.95 million units, compared with 4 million units in 1980.

1981 vehicle production was estimated at 11.17 million units, up from the previous year's 11.04 million units. But when minicars (less than 550 cc) were excluded, the output was down at an estimated 9.8 million units from the 1980 total of 9.93 million units, the first year-on-year drop since 1974.

Motor analysts say that bleak exports and slow domestic sales will remain basically unchanged in the new year.

Individual car producers agree on dim export prospects but dissent on a poor domestic sales outlook.

Toyota Motor, the industry's leader, has officially targeted its 1982 domestic sales 10 percent above the year-before level while predicting a modest 1.2 percent increase in exports. The company set its production goal at 3.38 million units, up 5 percent.

Nissan has been a shade less bullish. It has envisaged a 3.7 percent increase in production, a 1.0 percent gain in exports and a 7.2 percent growth in domestic sales.

But with many private economic centers forecasting another year of rather slow individual spending, the aggressive sales plans by the two car giants could mean an intensified price-cutting war on the already highly competitive home market.

In the export business, Toyota officials say that the company will try hard to ship more expensive models to make up for a possible drop in sales, which may result from a reduced volume of exports in 1982.

For example, they say, the sports car-type Celica will now replace the popular Corolla as the mainstay export item in the U.S.

Car executives are agreed that the industry's long-range future depends on how soon companies can develop fuel-efficient small cars and make necessary investment arrangements to assembly them in key overseas markets.

Honda Motor's assembly plant, now under construction at Columbus, Ohio, is due to start turning out 120,000 Accord compacts a year late in 1982.

Nissan is constructing a truck-building plant near Nashville, Tennessee. The company has also announced plans to start producing small cars in Naples in early 1983 in a tieup with Italy's Alfa-Romero, and has acquired a 36 percent equity share in Spain's Motor Iberica for possible production there of Nissan trucks in future.

Toyo Kogyo, the maker of Mazda cars, has been producing compacts for Ford Motor, while Isuzu Motors and Suzuki Motors have joined with General Motors for development of economy cars.

Honda has just expanded its tieup agreement with Britain's BL for joint development and production of a new luxury car with an engine displacement over 2,000 cc.

In Britain, Nissan has completed a year-long feasibility study of a plan to locate a car assembly plant there and is expected to announce a final decision "within a month or two."

So far Toyota has been ominously silent. In a recent interview, President Eiji Toyoda denied reports that the firm is seeking to buy a tract of land in the U.S. for an assembly plant.

Toyoda said, "At the present moment, I see no merit (in building a plant in the U.S.)," but cautiously added, "we have plans under study."

CSO: 4120/107

FUTURE COMMERCIALIZATION OF BIOTECHNOLOGY DISCUSSED

Tokyo KABUSHIKI NIPPON in Japanese 5 Nov 81 pp 27-31

[Text] A Giant Market That Surpasses Electronics

How much expansion will be seen in the market scale of biotechnology?

According to the calculations of Genentech, one of the venture businesses that caused the genetic engineering boom in the United States, the scale of the genetic engineering industry in the United States in 1999 is estimated at 6 trillion yen.

However, biotechnology is more than just gene splicing. Gene splicing is merely one of the areas in biotechnology. Since the estimate of 6 trillion yen is only for the genetic engineering industry, needless to say, the scale for biotechnology as a whole will be much larger.

A brief explanation of the substance of biotechnology is in order here. Biotechnology is translated as "life engineering," but, specifically, it is "a technology that makes industrial use of various functions of microorganisms and enzymes." It is classified into several areas according to the utilization of these functions.

First, gene splicing is a technology that endows a new characteristic to a microorganism through the cutting and splicing of its genes.

Second, cell fusion is a technology to create a new type of cell by fusing heterogenous populations of uncoated cells.

Third, mass cell culture technology is a technology to grow the cells of a living body in a tank.

Fourth, bioreactor technology carries out complex chemical reactions simply by combining biological catalysts, enzymes.

Related technologies include the fixed enzyme technology and semisynthesis techniques that combine fermentation techniques and synthesis techniques.

In Japan, biotechnology as a whole is expected to grow to an approximately 4-trillion-yen business according to MITI. However, this figure excludes areas of energy and foods, and when energy and food figures are added, the market scale is expected to be twice as large, approximately 8 trillion yen. Based on these projections, the market scale in the United States may be assumed to surpass 10 trillion yen by far.

How big is a market scale of 8 trillion yen in Japan? The current electronics market scale, including related fields, is approximately 6 trillion yen. So, it is a scale that surpasses electronics by far, and the field is expected to establish its position as a leading industry in the next 10 years.

The current biotechnology-related scale is still very small, estimated at 5 billion yen at the most. This means a rapid, 1600-fold growth is to be accomplished in the next 14 years. It can be said to be the biggest growth area in the future with respect to both the giant market scale and the high speed of growth.

The background for this prediction of such rapid growth is that in addition to the broad areas of application mentioned before, it is the field of technological innovation most suited to Japan.

Japanese industry is going through a change toward a knowledge-intensive structure, having the predestined background of a poor-resource country. Today, leading Japanese industries have shifted toward knowledge-intensive forms such as electronic engineering based on semiconductor technology and the automobile industry supported by maintenance technology.

Biotechnology has many aspects in common with electronics. The latter is the technological innovation in the micro world called electrons, and the former is also a technological innovation in the micro world called microorganisms. They have something in common in the sense that they are resource-conserving and knowledge-intensive (application technology and knowhow as weapons). From these aspects alone, biotechnology possesses the good possibility of a high growth heading for heading industries. But there is another big weapon in biotechnology.

That is the fact that Japan has the world's highest accumulation and level of microbial application technology and fermentation technology, which serve as the foundation in biotechnology. Achievements in the use of microorganisms in bean paste and soy sauce manufacturing from early years are attributable to the climate of high temperature and high humidity where microorganisms readily grow. The fact that the majority of the leading researchers currently active overseas are Japanese scholars demonstrates that biotechnology is a very Japanese technology.

To be sure, the Euro-Americans are ahead of the Japanese at present in biotechnology. However, as a consequence of having the foundation mentioned above and the characteristic of being ingenious in applications, such as was found in the case of semiconductors, it is expected that it will not be difficult for the Japanese to catch up quickly with the Euro-Americans once they begin moving in earnest and to leap to the world's top position. Euro-American concerns even agree in the view that "the final victor in biotechnology will be the Japanese as in the case of electronics."

The Euro-American countries are trying to consolidate their defense structure with a patent offensive. However, in view of the fact that the Japanese policy is not to recognize basic patents by considering them as well-known facts and that there is an effective term for patents in case of venturing overseas, the problem will not be a great one. In the future, biotechnology can be expected to support Japanese industry as the priority international industry and, at the same time, to become active in international markets.

However, the growth potential of an industry is not necessarily linked to the profit growth of the enterprise. Atomic power is a good example. However, having large growth potential as an industry is an important condition for the profit growth of an enterprise. Moreover, biotechnology does not require as huge an investment as atomic power. The fact that it is a knowledge-intensive type also means that it has a high added value, and profit growth in biotechnology-related enterprises can be fully expected. It may be said that it is equipped with more than enough requisites to play an active major role in new market prices.

Move for Industrialization and Areas To Watch For

It has been almost a year since biotechnology became the talk of the town. During this time, the response in industrial circles has moved at an unexpectedly rapid tempo. We are about to reach the stage of actually contributing to profits, and not remain a fantasy story any longer.

Only a year ago, talk of biotechnology lacked specificity, and not even the directions of industrial responses were clearly known.

However, the subsequent moves of industrial circles were swift. The development of technologies for practical applications appeared one after another. We shall cite several specific examples here. Ajinomoto succeeded in improving threonine (one of the essential amino acids) productivity by recombinant DNA using E. coli. Showa Denko succeeded in cutting the cost of tryptophan (one of the essential amino acids) in half through a semisynthesis technique. Sumitomo Chemical developed a specific drug for dwarfism by recombinant DNA; Green Cross developed an immunoglobulin collection technique using cell fusion; Kyowa Hakko has a prospect for the mass production of interferon using a mass cell culture technique; Santory developed an antineoplastic substance using cell fusion; etc.

These are merely some examples. Because they have accumulated technologies that become the foundation for biotechnology, they are advancing to a stage when achievements are made unexpectedly fast once the motion is set.

MITI chose biotechnology as "the Next Generation Basic Industrial Technology," and plans to support development of industrial bioreactors, mass cell culture technology, and recombinant DNA technology.

In response to this, 14 leading companies in industrial circles also got together and are hurrying practical applications. They are Mitsubishi Chemical, Takeda Chemical, Sumitomo Chemical, Kyowa Hakko, Asahi Chemical, Mitsui Toatsu, Ajinomoto, Toyo Jozo, Mitsubishi Gas Chemical, Daicel, Kao Soap, Mitsui Petrochemical, Electro Chemical, and Mitsubishi Chemical Life Science Institute.

Regarding bioreactors, Mitsubishi Chemical, Kao Soap, Daicel, and Gas Chemical work on reactors for chemical compound oxidation, and Mitsui Petrochemical and Electro

Chemical have taken charge of reactors for reduction reactions. Regarding mass cell culture technology, Takeda, Kyowa Hakko, Ajinomoto, Asahi Chemical, and Toyo Jozo will aim for lowered cost and efficiency in pharmaceutical products, and Sumitomo Chemical, Mitsui Toatsu, and Mitsubishi Life Science Institute will engage in recombinant DNA technology aiming at the development of new substances.

Such a positive posture with the concerted effort of the government and private concerns further accelerated the tempo of practical applications, and there is a good chance that the work will shape up as an industry in the next 1-2 years and emerge rapidly.

According to a questionnaire survey by Nihon Keizai Shimbun, as many as 95 firms have already made plans for commercialization in biotechnology. Seven firms are scheduled for commercialization within a year, and as many as 19 firms, within 3 years. One may say that the stage of fantasy has already been put behind.

The first target of these firms is pharmaceuticals. They are aiming for the development of new drugs, including diagnostic drugs and test drugs, and for mass production at low cost of precious drugs that are difficult to mass-product (e.g., interferon, hormones, vaccines).

Firms aiming for pharmaceuticals number nearly half, 42, of the 95 firms. One may say that it is due to the fact that pharmaceuticals are high value-added items and a high growth market. Targets that follow pharmaceuticals include areas of chemical products, food products, and energy.

Table 1. 91 Promising Firms To Watch for in the Coming Biotechnology.

Name	Business Area of Development	Applied Technology	Force of Development	Remarks
Mitsubishi Gas Chem	Chem, Energy	DNA, Fix Enz	B	Aim for combined C_1 chemistry and genetic engineering
Mitsui Petrochemical	Physio, Pharm	Ferment, Fusion, Culture	B	Development of pharmaceuticals through mass culture of plant cells
Mitsubishi Petrochemical	Pharm	DNA, Fusion, Culture, Ferment	A-B	To mass-produce drug-screening enzymes by genetic application
Japanese Geon	Pharm	DNA	C	Planning for pharmaceuticals venture with genetic manipulation
Sekisui Chemical	Energy	Ferment	B	Concentrating on research in alcohol fuel
Nippon Kayaku	Pharm, Chem	DNA, Fusion, Fix Enz	A-B	Research in applications directed toward the development of new pharmaceuticals
Asahi Denka	Chem, Food	Fix Enz, Ferment	C	Focus on development of fats-oil-related mass production technology
Nippon Oils and Fats	Chem	Fix Enz	C	Developed a technique to use enzymes for fatty acid manufacturing; test producing
Kao Soap	Food Chem Pharm	DNA, Fix Enz	B-C	Discovered microorganism for mass production of surface activator; practical application planned
Sanyo Chem	Chem, Pharm	Ferment Fix Enz	C	Developed enzyme immunodiagnostic agent
Nippon Paint	Chem, Pharm	DNA, Culture	C	Began research at the Technical Center
Kansai Paint	Chem, Energy	Fix Enz, Ferment	B-C	Leading in fixed enzyme technology; developed alcohol fuel
[Dainippon] Ink [& Chem]	Food, Chem	Fusion	C	Studying use of methanol-metabolizing bacteria

Lion [Fat & Oil]	Agric, Pharm Energy	DNA, Fusion, Fix Enz	B–C	Concentrating on drug development, led by the Science Laboratory
Sun Star	Pharm	Fusion, Culture	B–C	Focus on interferon, antibiotics
Takeda	Pharm	Fusion, DNA	A	Collaborative research structure with Roche; concentrating on interferon
Sankyo	Pharm	Fusion, DNA	B–C	Commercial distribution of nuclease, SI enzyme
Yamanouchi	Pharm	Fusion, Ferment	B	Focus on antibiotics at the Cell Physiology Research Laboratory
Dainippon Pharmaceut	Pharm	DNA, Fusion	B	Concentrating on the development of anti-neoplastic agents
Shionogi	Pharm	DNA, Fix Enz Fusion	B	Acquired basic technology for insulin production; applying it to antibiotics
Tanabe Seiyaku	Pharm, Food	Fix Enz	B	Established techniques for continuous production of amino acids, ethanol
Yoshitomi Pharm	Pharm	DNA	C	Concentrating on R & D at the Central Laboratory
Fujisawa Pharm	Pharm	DNA, Fusion	B	Focus on cost reduction of antibiotics and development of new drugs
Banyu Pharm	Pharm	DNA, Fusion	C	Began research in antibiotics
Chugai Pharm	Pharm, Physio	DNA, Fusion	B	To full-scale practical application of physiologically active substances and new drugs
Green Cross	Pharm	DNA, Fusion	A	Technical collaboration with three U.S. firms; established cell fusion technique on its own and practical application planned
Eisai	Physio, Pharm	DNA, Culture	C	Began research forming a bioscience group; goal set at 10 years hence
Tokyo Tanabe	Pharm	Fix Enz	B–C	Goal set at 3-4 years hence centered on medical enzyme preparations

Mochida Pharm	Pharm	Culture, Fusion	A	Close relation with Ringen; began interferon production
Taisho Pharm	Pharm	DNA, Fusion	C	Development at the Central Laboratory; studying overseas collaboration
Wakamoto	Pharm	DNA	C	Began development at the Biological Science Laboratory
Ri[ken] Vita[min]	Food	Ferment	C	Studying application in food products with a prospect in 1-2 years
Takasago Perfumery	Chem, Energy	Ferment, Fix Enz	C	Application to biomass fuel and flavor development
Nippon Oil	Energy, Pharm	Fix Enz, Ferment	B-C	Focus on development of alcohol for fuel and antineoplastics
Maruzen Oil	Physio, Others (enzymes)	Fix Enz	C	Concentrating on enzyme development
Toyo Rubber	Pharm	Fix Enz	C	Established fixed enzyme technique
Nippon Mining	Chem, Energy	Fix Enz	C	Focus on energy-saving petrochemical technology at the subsidiary, Bioresearch Center
Hitachi Shipbuilding	Others (related equipment)	—	C	Focus on production apparatus such as bioreactors
Mitsui Shipbuilding	Energy, Others (equipment)	Ferment	C	Alcohol fuel, disaster prevention equipment
Ube Industries	Others (equip)	—	C	Plants for fuel alcohol
Japan Gasoline	Energy	Fix Enz	C	Development of petroleum-substitution fuel
Chiyoda Chem Eng Constr	Others (related equipment)	—	B	Began taking orders in biosystems engineering
[To]yo Engineering	Ferment, Energy	Ferment	C	Began to take orders for fermentation alcohol plants

Sanraku	Pharm, Food	Fix Enz, DNA Fusion	B	Biomass fuel research, commercialization of enzyme reagents
Calpis	Pharm, Food	Fusion, Ferment	C	Developing antineoplastic substances by cell fusion
Kikkoman	Physio, Pharm, Food	Ferment, Fusion, DNA	A-B	Top class in cell fusion technology
Ajinomoto	Drug, Food, Chem	DNA, Fix Enz	A	Second place with DNA-related patents; investing 2 billion yen in research
Kagome	Agric	Fusion	C	Studying tomato crop improvement at the General Research Laboratory
Kobo Ko	Others (enzymes)	Fusion	B	Commissioned development of fixed enzyme technique to the Research Development Corp of Japan
Japan Maize	Pharm, Food	Fix Enz	C	In basic research stage
Toyobo	Pharm, Others (enzymes)	Fix Enz Culture	C	Commercialization of fixed enzymes for reagents
Kanebo	Pharm	Fix Enz, Fusion, Culture	C	Application to new drug development is under study at the Chemical Research Laboratory
Unitica	Pharm, Chem	Fix Enz	C	Concentrating on bioreactor research; prospect for commercialization in 2-3 years
Nittobo	Pharm, Others (enzymes)	Fix Enz	C	Immediate goal is the commercialization of restriction enzymes
Teijin	Pharm, Chemicals	DNA, Ferment	B	Aiming for the mass production of chemicals by genetic manipulation
Toyo Rayon	Pharm, Food	DNA, Fix Enz	A-B	Developing mass production technology for interferon and antibiotics
Mitsubishi Rayon	Energy	Fix Enz	C	Research in alcohol fuel

Kuraray	Pharm, Chem Agric	DNA, Ferment	B-C	Concentrating on mass production techniques for pharmaceutical intermediate materials
Asahi Chem	Pharm	Culture, DNA	B	Developing carcinonecrotic factor through gene technology application
Sangoku P	Others (enzymes)	Culture, Fusion	C	Goal is commercialization of fixed enzymes and DNA
Oji Paper	Agric	Culture, Fusion	C	Research in forest tree breeding
Jujo Paper	Pharm, Food	Ferment	C	Goal of mass production in bulk pharmaceuticals
Mitsui Toatsu	Pharm, Food	Fix Enz, Ferment DNA	C	Collaborative development structure with subsidiary Mitsui Pharmaceuticals
Nitto Chem	Chem	Fix Enz	C	Successful introduction of microbial application to petrochemical production process
Showa Denko	Pharm, Food, Chem	Ferment, DNA	B	Established technology for 50% cost reduction for essential amino acids; heading to commercialization
Sumitomo Chemical	Pharm, Chem	DNA, Culture, Ferment	A-B	Focus on practical application of interferon using cell culture
Mitsubishi Chemical	Pharm, Food, Chem	DNA, Ferment, Fix Enz, Fusion	A	Technical accumulation at the Life Sciences Institute is top level; move toward practical application in broad areas
Seitetsu Kagaku	Pharm	Ferment	C	Target is pharmaceutical intermediates
Nippon Soda	Pharm, Chem	DNA	B	Aiming toward development of agricultural, pharmaceutical chemicals, amino acids
[To]yo Soda	Pharm, Food	DNA, Ferment	C	Research in enzyme analyzer, sweeteners
Tokuyama Soda	Pharm, Energy	Fix Enz	B	Developed a seawater uranium recovery system using microorganisms
Electro Chemical	Pharm, Chem	Ferment, Fix Enz	C	Took a vaccine manufacturer, Toshiba Chemical, under its wing

Hitachi	Others (related equipment)	--	B-C	Taking orders for P_1-P_4 group boxes
Fuji Electric	Others (related equipment)	--	B-C	Taking orders for biohazard preventive facilities
Nippon Suisan	Pharm, Food	Fix Enz	C	New material using marine microorganisms
Morinaga Pharm, Confestionery	Food, Chemicals, Agric	DNA, Fusion	B	Investing with 30-some researchers at the Biochemistry Laboratory
Meiji Seika	Pharm, Physio	DNA, Fusion Fix Enz	A	Prospect for antibiotic production technique using cell fusion
Meiji Milk	Pharm, Food	DNA	C	Studying interferon
Snow Brand Milk Prod	Pharm, Food	Fix Enz Ferment	B	Strengthened steering to pharmaceuticals
Morinaga Milk	Pharm, Food, Chem	DNA, Culture	A-B	Industrialization of lactobacilli mass production; rapid development in pharmaceuticals as well
Yakuruto	Pharm, Food	DNA, Fusion	B	Commercialization of fixed enzymes
Sapporo Breweries	Pharm, Food, Agric	DNA, Fusion, Culture	C	Research in antineoplastic, high molecular weight selenium substances in metals
Asahi Brewery	Food, Pharm Agric	DNA, Fusion, Fix Enz	C	Making progress in application study of yeast cells to pharmaceuticals
Kirin Brewery	Agric	DNA, Fusion	C	Concentrating on new breeding technology of yeast
Takara Shuzo	Pharm, Others (enzymes)	DNA, Culture	B	Commercial distribution of restriction enzymes, DNA ligase; good results
Yoshuzo	Pharm	DNA	B	Studying antibiotics manufacturing process by genetic manipulation
Godo Shusei	Energy, Food	Fix Enz	C	Research in alcohol fuel

Shinetsu Chemical	Pharm, Others (metal)	Fix Enz	C	Concentrating on bacteria leaching
Shokubai Kagaku	Chem	DNA	C	Research in developing catalytic enzymes and application technology
Kanegafuchi Chemical	Pharm	Ferment,DNA	A-B	Practical application accomplished in production of pharmaceutical intermediates
Kyowa Hakko	Pharm, Food, Energy	DNA, Fusion Culture, Fix Enz	A	Prospect in interferon mass production using recombinant DNA

FOOTNOTES

1. Business area of development

Pharm--pharmaceuticals (include diagnostic and test drugs);
Food--food products (include amino acids);
Chem--chemical products;
Agric--agricultural products;
Physio--physiologically active substances

2. Applied technology

DNA--recombinant DNA;
Fusion--cell fusion;
Culture--mass cell culture;
Fix Enz--fixed enzyme (include bacteria and other microorganisms) technique;
Ferment--semisynthesis by fermentation, fermentation technique.

3. Force of development

Commercialization, R & D progress made, degree of effort made, area of development, etc, are considered together and graded into a three-rank classification of A, B, and C.

7722
CSO: 4106/19

SCIENCE AND TECHNOLOGY

ATOMIC ENERGY WHITE PAPER FOR 1981 SUMMARIZED

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 50, 14 Dec 81 pp 1-6

[Text]

The Atomic Energy Commission (headed by Science & Technology Agency Director-General Ichiro Nakagawa) issued on December 4 a white paper on atomic energy for 1981 — the 24th such paper published in Japan.

Japan's peaceful utilization of atomic energy has centered on the development of nuclear power reactors. With a total of 22 nuclear power reactors now in operation with a combined capacity of 15,511,000 kilowatts, Japan boasts the world's third largest nuclear power generating capacity, after the U.S. (74 units; 57 million kw) and France (29 units; 22 million kw).

In addition to the foregoing 22 reactors, 11 reactors with a combined capacity of 10,110 MW are under construction, while construction planning is under way for 6 reactors of 6,105 MW. Altogether, these plants will increase Japan's total nuclear power generating capacity to 31,726 MW by the end of 1989 - the total of projects approved so far by the Electric Power Development Coordination Council.

This year marks a quarter of a century since the Basic Law on Atomic Energy went into effect and the Atomic Energy Commission was established. During this period, Japan's nuclear power generation has grown to such an extent that in fiscal 1980 (which ended March 31, 1981) the electricity generated by nuclear power reactors accounted for approximately 16 percent of the nation's total electric power generation; and approximately 5 percent of total primary energy supplies. Nuclear power, along with coal, LNG, and hydraulic power, now constitute four main pillars of non-oil, alternative energy supplies for Japan, representing approximately 5, 17, 6 and 6 percent, respectively.

Meanwhile, the average unit capacity factor of nuclear power reactors has improved remarkably in recent years, as shown below:

Fiscal Year	Unit Capacity Factor
1975	42.2%
1976	52.8
1977	41.8
1978	56.7
1979	54.6
1980	60.8
1981 (April-September)	65.9

During the past 25 years, the governmental budget for the atomic energy development has increased more than one thousand times, to ¥271,250 million ($1,233 million) for fiscal 1981; the private sector's capital expenditures have also expanded more than one thousand times, to ¥1,418,800 million ($6,450 million) for fiscal 1979.

Quite contrary to the spectacular growth in the utilization of atomic energy, Japan's nuclear power industry faces a serious problem in opposition by local residents to new nuclear power plant projects, opposition which is now causing considerable delays in the construction of new nuclear power reactors at a number of sites throughout the country. The average consensus-formation period — the time between the local government's resolution to invite a new project and the approval of the plan by the Electric Power Development Coordination Council — has more than doubled, from 23 months around 1970 to 56 months for the recent past. In one extreme case, it took 16 years from the selection of the site to the start of operation of the nuclear power reactor.

Apparently influenced by these developments in recent years, the Ministry of International Trade and Industry (MITI) successively revised downward its previously announced targets for the nation's nuclear power development, as follows:

(unit: million kw)

Date of Forecast	Target for Fiscal 1985	Target for Fiscal 1990
July 25, 1974	50-70	-
July 12, 1975	49	-
June 6, 1977	33	60
August 31, 1979	30	53
November 28, 1980	-	51-53

The latest revised target of 51-53 million kw for fiscal 1990 as forecast by MITI in November 1980 is expected to be lowered 5 to 10 percent in the updating work now under way.

Summarized below is the current status of nuclear energy development in Japan:

Public Hearings

An accident involving radioactive leakage at the Japan Atomic Power Co's nuclear power plant at Tsuruga, Fukui Prefecture, was uncovered on April 18. Undoubtedly, this accident helped deepen the local residents' anxiety about the safety of nuclear reactors.

In this connection, all parties concerned are urged to actively participate in both the public hearings sponsored by MITI, i.e. the primary public hearings, and secondary ones sponsored by the Nuclear Safety Commission. Since their institution, three primary public hearings have been held so far -- they were for Tokyo Electric Power's Kashiwazaki-Kariwa No.2 and No.5 reactors (held in December 1980), Chugoku Electric Power's Shimane No.2 reactor (held in January 1981) and Tohoku Electric Power's Maki No.1 reactor (held in August 1981); five secondary public hearings, including Japan Atomic Power's Tsuruga No.2 reactor (held in November 1980) and Chubu Electric Power's Hamaoka No.3 reactor (held in March 1981).

Government Measures to Facilitate Construction of Nuclear Power Reactors

In an effort to overcome the opposition of local residents to nuclear power reactor projects, the government instituted in October new policy measures centering on a grant-in-aid program to be offered to prefectures where nuclear power reactors are constructed. (For details, see JPEW October 5 - pp.1-5.)

Natural Uranium Supply

Japanese electric utilities' long-term natural uranium purchase contracts with Canada, France, U.K. and Australia now total about 173,000 short tons (U_3O_8 basis). In addition, the Tokyo-based Overseas Uranium Resources Development Co., now producing natural uranium in Niger, is expected to supply a total of 20,000 short tons to Japan. (Japan's indigenous uranium reserve is limited to about 10,000 short tons.) Altogether, these supplies are expected to meet Japan's requirements through the late 1980's. It is urged that Japan steps up exploration and exploitation of new uranium resources in overseas areas in Africa (particularly in Mali), Canada and Australia. Meanwhile, a model plant for extracting uranium from sea water is under construction by the Metal Mining Agency of Japan for operation by 1983.

Uranium Enrichment

Departing from Japan's complete dependence on the U.S. and France for uranium enrichment, the semi-governmental Power Reactor & Nuclear Fuel Development Corp. built a pilot plant for uranium enrichment in September 1979 at Ningyo Pass, Okayama Prefecture, with its capacity to be raised to produce 70 tons separative work unit (SWU) of enriched uranium (3.2%) per year by the end of 1981. A task force's report issued in August recommends nationalization of uranium enrichment at as early a date as possible, calling for operation of a commercial plant in the late 1980's, increasing the enrichment capacity to at least 3,000 SWU a year by around 2000.

Reprocessing of Spent Nuclear Fuel

Japan and the U.S. agreed on October 30 that the U.S. would permit Japan's first reprocessing plant at Tokai-mura, Ibaraki Prefecture (which started operation in September 1977 in accordance with a Japan-U.S. agreement) to reprocess up to 210 tons a year of U.S.-origin spent nuclear fuel, until a long-term agreement is concluded which is expected to be reached between the two countries by the end of 1984. Plans are now under way for the private sector to construct a 1,200-ton-a-year plant for operation by around 1990. A company, Nuclear Fuel Service Co., Ltd., was established on March 1, 1980, by a consortium of electric utilities to construct and operate this plant.

Advanced Thermal Power Reactors

The placing of a 165-MW advanced thermal power reactor (ATR) "Fugen," a prototype heavy water reactor, into operation in March 1979 at Tsuruga heralded a new era in Japan's nuclear power development. It bridges the transition from light water reactors (on which Japan now relies predominantly) to fast breeder reactors (which are expected to become a main pillar of nuclear power generation in the 21st century.) The ATR Fugen started using the locally recovered plutonium in November, thereby completing Japan's nuclear fuel cycle for the first time.

Plans are now under way, in accordance with a report issued in August 1981 by a task force, for constructing an ATR demonstration plant by the private sector, with the government playing an important role to support the project from an energy security standpoint.

Fast Breeder Reactors

Since its attainment of the initial criticality for nuclear fission in April 1977, the experimental reactor "Joyo" (75 MW) marked its 10,000-hour operation in April 1981. Plans are now under way for constructing a prototype FBR "Monju" (280 MW) for reaching an initial criticality in fiscal 1987, which will be followed by a demonstration reactor.

Multi-Purpose High Temperature Gas Reactors

In an attempt to develop a multi-purpose high temperature gas reactor, another form of utilizing the atomic energy apart from the nuclear power generation, plans are under way to construct an experimental plant called "Helium Engineering Demonstration Loop" (HENDEL) for operation by the late 1980's, producing high-temperature gas at around 1,000°C; 1,830°F.

Nuclear Fusion

An experimental Energy Breakeven Plasma Testing Device "JT-60*" is now under construction for operation by 1984.

(*) "J" stands for JAERI (i.e. the Japan Atomic Energy Research Institute); "T" stands for Tokamak type; "60" represents plasma volume in cubic meters.

JAPAN'S NUCLEAR POWER GENERATING PLANTS (as of December 31, 1981)

Company	Identification of Plant	Location of Plant (see map)	Type of Reactor*	Approved Output,MW	Date Onstream
A. In Commercial Operation					
Japan Atomic Power Co.	Tokai-1	Ibaraki Pref.	GCR	166	Jul. 25, 1966
	Tokai-2	Ibaraki Pref.	BWR	1,100	Nov. 28, 1978
	Tsuruga-1	Fukui Pref.	BWR	357	Mar. 14, 1970
				1,623	
Tokyo Electric Power Co.	Fukushima I-1	Fukushima Pref.	BWR	460	Mar. 26, 1971
	Fukushima I-2	Fukushima Pref.	BWR	784	Jul. 18, 1974
	Fukushima I-3	Fukushima Pref.	BWR	784	Mar. 27, 1976
	Fukushima I-4	Fukushima Pref.	BWR	784	Oct. 12, 1978
	Fukushima I-5	Fukushima Pref.	BWR	784	Apr. 18, 1978
	Fukushima I-6	Fukushima Pref.	BWR	1,100	Oct. 24, 1979
				4,696	
Chubu Electric Power Co.	Hamaoka-1	Shizuoka Pref.	BWR	540	Mar. 17, 1976
	Hamaoka-2	Shizuoka Pref.	BWR	840	Nov. 29, 1978
				1,380	
Kansai Electric Power Co.	Mihama-1	Fukui Pref.	PWR	340	Nov. 28, 1970
	Mihama-2	Fukui Pref.	PWR	500	Jul. 25, 1972
	Mihama-3	Fukui Pref.	PWR	826	Dec. 1, 1976
	Takahama-1	Fukui Pref.	PWR	826	Nov. 14, 1974
	Takahama-2	Fukui Pref.	PWR	826	Nov. 14, 1975
	Ohi-1	Fukui Pref.	PWR	1,175	Mar. 27, 1979
	Ohi-2	Fukui Pref.	PWR	1,175	Dec. 5, 1979
				5,668	
Chugoku Electric Power Co.	Shimane-1	Shimane Pref.	BWR	460	Mar. 29, 1974
Shikoku Electric Power Co.	Ikata-1	Ehime Pref.	PWR	566	Sept. 30, 1977
Kyushu Electric Power Co.	Genkai-1	Saga Pref.	PWR	559	Oct. 15, 1975
	Genkai-2	Saga Pref.	PWR	559	Mar. 30, 1981
				1,118	
Subtotal of 22 plants (A)				15,511	
B. Under Construction					
Tohoku Electric Power Co.	Onagawa	Miyagi Pref.	BWR	524	Jun. 1984
Tokyo Electric Power Co.	Fukushima II-1	Fukushima Pref.	BWR	1,100	May 1982
	Fukushima II-2	Fukushima Pref.	BWR	1,100	Jan. 1984
	Fukushima II-3	Fukushima Pref.	BWR	1,100	Jul. 1985
	Fukushima II-4	Fukushima Pref.	BWR	1,100	Feb. 1986
	Kashiwazaki-Kariwa-1	Niigata Pref.	BWR	1,100	Oct. 1985
Kansai Electric Power Co.	Takahama-3	Fukui Pref.	PWR	870	Feb. 1985
	Takahama-4	Fukui Pref.	PWR	870	Aug. 1985
Shikoku Electric Power Co.	Ikata-2	Ehime Pref.	PWR	566	Mar. 1982
Kyushu Electric Power Co.	Sendai-1	Kagoshima Pref.	PWR	890	Jul. 1984
	Sendai-2	Kagoshima Pref.	PWR	890	Mar. 1986
Subtotal of 11 plants (B)				10,110	
C. Under Planning					
Japan Atomic Power Co.	Tsuruga-2	Fukui Pref.	PWR	1,160	Mar. 1986
Tokyo Electric Power Co.	Kashiwazaki-Kariwa-2	Niigata Pref.	BWR	1,100	Apr. 1989
	Kashiwazaki-Kariwa-5	Niigata Pref.	BWR	1,100	Oct. 1989
Chubu Electric Power Co.	Hamaoka-3	Shizuoka Pref.	BWR	1,100	Mar. 1986
Chugoku Electric Power Co.	Shimane-2	Shimane Pref.	BWR	820	Sept. 1988
Tohoku Electric Power Co.	Maki-1	Niigata Pref.	BWR	825	Aug. 1989
Subtotal of 6 plants (C)				6,105	
Total of 39 plants (A + B + C)				31,726	

Memo: In addition to the above reactors in commercial operation, a 165-MW prototype advanced thermal reactor, owned by the semi-governmental Power Reactor & Nuclear Fuel Development Corp. (PRNFDC) and named "Fugen" after one of the Buddhist saints, went onstream on March 20, 1979, at Tsuruga, Fukui Pref. The electric power generated by this reactor is being sold to Hokuriku Electric Power Co. Meanwhile, a 280-MW prototype fast breeder reactor "Monju" (named after another Buddhist saint and also owned by PRNFDC) is planned for construction at Tsuruga.

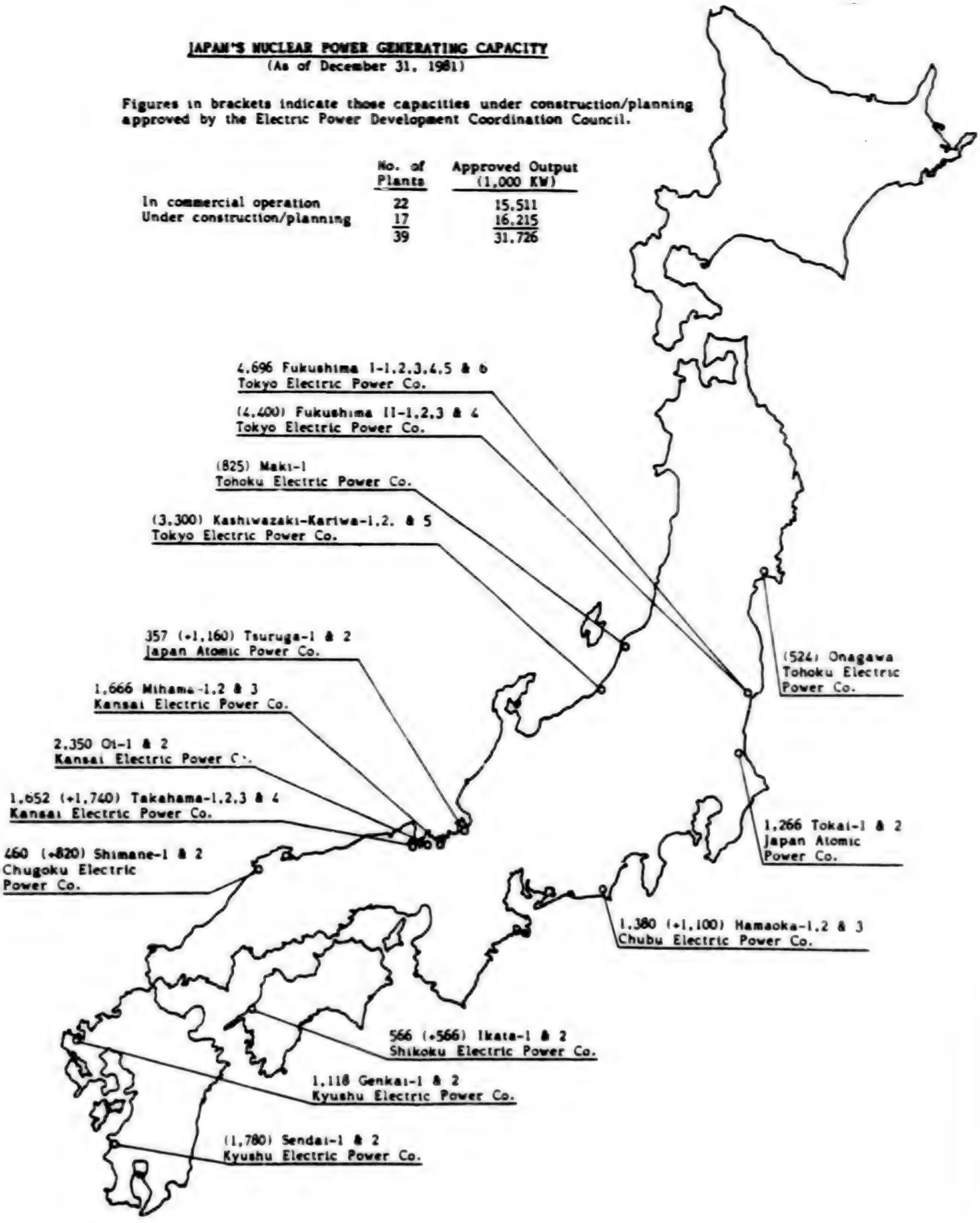
(*) GCR = Gas-cooled reactor; BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

JAPAN'S NUCLEAR POWER GENERATING CAPACITY

(As of December 31, 1981)

Figures in brackets indicate those capacities under construction/planning approved by the Electric Power Development Coordination Council.

	No. of Plants	Approved Output (1,000 KW)
In commercial operation	22	15.511
Under construction/planning	17	16.215
	39	31.726


4,696 Fukushima I-1,2,3,4,5 & 6
Tokyo Electric Power Co.
(4,400) Fukushima II-1,2,3 & 4
Tokyo Electric Power Co.
(825) Maki-1
Tohoku Electric Power Co.
(3,300) Kashiwazaki-Kariwa-1,2, & 5
Tokyo Electric Power Co.
357 (+1,160) Tsuruga-1 & 2
Japan Atomic Power Co.
1,666 Mihama-1,2 & 3
Kansai Electric Power Co.
2,350 Oi-1 & 2
Kansai Electric Power Co.
1,652 (+1,740) Takahama-1,2,3 & 4
Kansai Electric Power Co.
460 (+820) Shimane-1 & 2
Chugoku Electric
Power Co.
(524) Onagawa
Tohoku Electric
Power Co.
1,266 Tokai-1 & 2
Japan Atomic
Power Co.
1,380 (+1,100) Hamaoka-1,2 & 3
Chubu Electric Power Co.
566 (+566) Ikata-1 & 2
Shikoku Electric Power Co.
1,118 Genkai-1 & 2
Kyushu Electric Power Co.
(1,780) Sendai-1 & 2
Kyushu Electric Power Co.

CSO: 4120/101

RRJAEL DIRECTORS TO DISCUSS THIRD RJ500 PARTNERS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 pp 3,4

[Text]

Rolls-Royce & Japanese Aero Engines Ltd. (RRJAEL), a joint venture for the development of the RJ500 engine for a 150-seat aircraft, will hold the eighth board of directors meeting in Britain on Jan. 25 to deal mainly with possible third partners for the RJ500 program.

Rolls-Royce has so far held talks with Pratt & Whitney Aircraft Division (P&W) of United Technologies, General Electric Corp. (GE), Snecma and other foreign aircraft engine manufacturers on their possible participation in the Anglo-Japanese program.

At the coming meeting, Rolls-Royce will brief the Japanese side on the talks before discussing how to cope with the third partner questions.

RRJAEL's basic stand indicates that it would maintain the current RJ500 development policy and take the initiative in the program even if third partners take part. It has no intention to make any great concession in order to invite third partners.

At the talks with Rolls-Royce, P&W and the GE/Snecma group proposed respective engines of the PW2037-based STF626/633 and the CFM56-2000, both similar to the 25,000-pound-class RJ500 for a 150-seat transport.

The Japanese side, consisting of Ishikawajima-Harima Heavy Industries Co. (IHI), Mitsubishi Heavy Industries Ltd. (MHI) and Kawasaki Heavy Industries Ltd. (KHI), basically welcomes the third partner participation, which they expect to reduce their share of the increased RJ500 development cost and avoid an internecine competition for the 150-seat transport engine.

At present, Rolls-Royce and the Japanese have a 50 percent share each of the RJ500 program. If P&W is selected the third partner in the program, Rolls-Royce, the Japanese group and P&W would hold a 30 percent share each. The remaining 10 percent share would be given to West Germany's Motoren und Turbinen Union GmbH, which has teamed up with P&W. If the GE/Snecma group is chosen as the third partner, a 25 percent share each would be held by Rolls-Royce, the Japanese group, GE and Snecma. In any case, the Japanese share would be 60 percent held by IHI, 25 percent by KHI and 15 percent by MHI as at present.

Japanese industry observers are now divided about whether RRJAEL should hasten a decision on the third partner. Some observers say RRJAEL, though planning to start a full-launch phase of the RJ500 program in late 1982, should make the decision as early as possible, because Japan's Civil Transport Development Corp., Airbus Industrie, Boeing Co. and the McDonnell Douglas/Fokker group have asked it to offer the RJ500 for their planned 150-seat aircraft. But others note RRJAEL may not be able to make the decision unless these airframe manufacturers come up with specific aircraft development programs.

CSO: 4120/102

SJAC SETS UP COMMUTER SURVEY COMMITTEE

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 pp 4,5

[Text]

The Society of Japanese Aerospace Companies (SJAC) inaugurated the Commuter Aircraft Survey Committee on Dec. 10 to look into the feasibility of the Japanese aircraft industry developing commuter aircraft in the future.

The results of the SJAC survey in FY 1979 and 1980 on small aircraft indicated that demand could grow for commuter aircraft in the future. Commuter traffic has sharply grown, mainly in the United States, since the 1973 oil crisis. The United States' 1978 airline deregulation has also brought about new growth potential for commuter carriers. These factors have prompted aircraft manufacturers of the world to develop new commuter aircraft.

The SJAC committee will deal with such subjects as current commuter aircraft markets in Japan and foreign countries, the markets' growth potential and the Japanese aircraft industry's countermeasures.

The new committee consists of 13 members, including Chairman Akira Azuma, Professor of Tokyo University; Ryohei Ito, Vice President, Japan Aeronautical Association; Hiroshi Yoshida, Vice President, ANA Engineering & Maintenance Headquarters; Akira Miyazawa, General Manager, TDA Engineering Department; and Toshio Hosokawa, General Manager, Business Department, MHI Aircraft & Special Vehicles Headquarters.

CSO: 4120/102

SCIENCE AND TECHNOLOGY

KHI CONSIDERING COMPOSITE MATERIALS FOR MT-X

Tokyo JPE AVIATION REPORT-WEEKLY in English 23 Dec 81 p 5

[Text]

Kawasaki Heavy Industries Ltd. (KHI), prime contractor for the development of the MT-X intermediate trainer for the ~~Air~~ Self-Defense Force, is considering using composite materials for the new trainer aircraft's vertical tail and other parts to develop a lightweight aircraft.

But such materials are expected to cost much money. For example, material costs alone are estimated at ¥15,000 to 20,000 per square meter. Aluminum alloy could be used with priority given to cost control.

The so-called advanced composite materials are carbon, boron and fibers mixed with resin and metals. Japan has used a hybrid of carbon fiber, and other epoxy resin for the fairing and landing gear door of the Boeing 767, boron fiber and epoxy resin for the F-15 fighter's tail, and fiber/epoxy resin for the KHI/MBB BK-117 helicopter.

Japan has also developed carbon fiber reinforced plastics (CFRP) experimentally used for the T-2 trainer's rudder and front landing gear door, the C-1 military transport's ground spoiler and the PS-1 flying boat's slat rail. These plastics have undergone more than 400 hours of flight tests.

In an experimental STOL (short takeoff and landing) aircraft under construction by the National Aerospace Laboratory, heat-resisting, honeycomb-structure composite materials, containing fiber reinforced plastics, are used for the upper surface of the main wing.

A possible composite material for the MT-X would be carbon fiber mixed with resin and metals. Some tests would be necessary before its adoption.

CSO: 4120/102

FIBER OPTICS COULD BE USED FOR NEW BADGE

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 pp 5, 6

[Text]

Fiber optics could be used for the Air Self-Defense Force's (ASDF) new BADGE automatic air defense system to secure reliability of digital data transmission and defend the system from enemy jamming, according to Nippon Electric Co., Fujitsu Ltd. and Hitachi Ltd., which are now preparing proposals for the new BADGE system at the request of the Defense Agency.

But fiber optic cables may be used for a limited part of the system, including the command post, because an amplifier is needed every two to three kilometers under the current insufficient fiber optic technology.

The three firms will submit their proposals to the Defense Agency in late January. The prime contractor for the new BADGE system will be selected from them, possibly by May.

The three contenders have indicated that the new BADGE system would include a sophisticated intercepting computer as the system's key component, consoles for displaying data from E-2C Hawkeye airborne early warning aircraft and new data links.

Their system designs and construction costs are kept in strict secrecy. Whichever is adopted, the agency would never make the proposals public.

The new BADGE contract was originally estimated at ¥700,000 million. But the agency now intends to minimize costs with useful parts of the current BADGE system retained to abide by the government's stepped-up fiscal reconstruction policy. At present, hardware alone for the new BADGE system is estimated to cost less than ¥100,000 million.

The Defense Agency wants the hardware of the new BADGE system to be manufactured by the domestic prime contractor. All the three contenders see such domestic hardware production as possible.

But they indicated some problems could arise with the Grumman E-2C aircraft. In order to display all the data collected by the aircraft on the ground, the same consoles as those mounted on the aircraft would have to be set up on the ground. Japan is to import complete E-2Cs from the United States.

There would also be the problem of how to link the new BADGE system with E-3A airborne warning and control system (AWACS) aircraft which the U.S. forces has deployed at its Kadena Air Base in Okinawa, southwestern Japan.

CSO: 4120/102

MHI TEAM VISITING U.S. FOR STUDY ON AIM-9L

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 p 7

[Text]

Mitsubishi Heavy Industries Ltd. (MHI), which was earlier named prime contractor for license production of the Raytheon AIM-9L Sidewinder air-to-air missile for the ASDF F-15J fighter-interceptor, sent a 30-man mission, including officials from subcontractors, to the United States in early December for a two-week survey on the AIM-9L production.

The team will visit Raytheon and its subcontractors to collect data for making an AIM-9L license production plan and estimating production costs prior to MHI's conclusion of an AIM-9L license production contract with the Defense Agency by the end of the current fiscal year or March 1982. MHI has already signed a license contract with Raytheon.

The ASDF's initial AIM-9Ls were ordered from the United States in FY 1980. The current fiscal year's AIM-9L order, the first one for domestic license production, will cover 171 units.

CSO: 4120/120

KHI TO PRODUCE AIT FOR P-3C UNDER LICENSE

Tokyo AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 p 7

[Text]

Kawasaki Heavy Industries Ltd. (KHI) will manufacture integrated avionics trainers (AITs) for maintenance engineers for avionics of the P-3C antisubmarine patrol aircraft under Lockheed license.

It has already revised its license contract with the U.S. aerospace giant so that it can produce AITs as well as P-3C airframes. The revised contract has been approved by the government.

The AIT is the first part of the naval air maintenance trainer system for the P-3C, which the MSDF is to procure in preparation for introduction of the aircraft.

The MSDF has earmarked ¥6,000 million for purchase of the AITs in the fiscal 1981 budget. An AIT procurement contract will be awarded to KHI by the end of the current fiscal year.

It has also sought ¥4,300 million in the FY 1982 budget request for purchase of maintenance trainers (MTs) for P-3C airframe maintenance technicians to complete the naval air maintenance trainer system for the P-3C. The MTs are expected to be designed and produced by KHI.

CSO: 4120/102

SCIENCE AND TECHNOLOGY

MHI TO BE GIVEN TORPEDO FABRICATION CONTRACTS

Tokyo JPE AVIATION REPORT-WEEKLY in English No 552, 23 Dec 81 p 10

[Text]

The Central Procurement Office of the Defense Agency has decided to award contracts to Mitsubishi Heavy Industries Ltd. under the FY 1981 research and development program for the second-stage full-scale fabrication of the GRX-2 high-speed homing torpedo and test fabrication of the GRX-3 antisubmarine short-range torpedo.

The contract for fabrication of eight GRX-2 torpedoes will be signed in March, the last month of FY 1981, with delivery planned for May 1983. In the FY 1981 budget, ¥4,120 million is earmarked for this contract. Another contract, for which ¥431 million is earmarked in the budget, will be concluded in February, calling for fabrication of a full system for the GRX-3 by September 1982.

The GRX-2 is a long-range torpedo to be mounted on submarines to attack high-speed, deep-cruising enemy submarines. The first-stage full-scale fabrication phase was carried out in FY 1980 after component-by-component fabrication ended in FY 1979. It is expected to receive service entry certification in FY 1984 or 1985 after the three-stage full-scale fabrication and subsequent technical and application tests.

The agency's TRADI has sought ¥2,260 million in its FY 1982 budget request for the third-stage fabrication. The development of the GRX-2 is estimated to cost a total of ¥11,800 million.

The GRX-3 program started with basic research in FY 1977. After fabrication of a full system funded in FY 1981, the institute intends to manufacture a new battery and a new motor under the FY 1982 budget. It has requested ¥160 million for the battery and motor fabrication.

CSO: 4120/102

SCIENCE AND TECHNOLOGY

JAPANESE COMPUTER INDUSTRY, OVERALL ASIAN TRENDS HIGHLIGHTED

Tokyo DIGEST OF JAPANESE INDUSTRY & TECHNOLOGY in English No 166, 1981 pp 7-8, 11-12

[Text]

General Trends

The Japanese computer industry began full-scale development from the mid-1960s and achieved international competitive power from the middle of the 1970s.

In the late 1960s, the computer production volume was only about 37 billion yen in value. But the figure jumped to 541.2 billion yen in 1975 and recorded a total of one trillion, 295.4 billion yen in 1980. The increase rate maintained a double digit pace for the past five years with the average production volume recording a high rate of 19 percent.

The computer production scale was 42 percent of industrial-use electronics equipment and occupied 14.9 percent of the entire electronics industry.

Generally speaking, a computer is a general-purpose computing machine. But the recent, amazing development of micro-electronics has led to diverse computer functions with a move toward distributed data processing. This has resulted in the development and practical application of computers which are applied according to usage such as the office computer (below 30 million yen), the personal computer (about one million yen) and the mini-computer.

The appearance of various types of computers was made possible through the rapid development of IC technology which led to practical application of the LSI and the super-LSI. The demand for peripheral and terminal computer equipment has increased because of diverse user needs. The production volume of these equipment is higher than the production of the computer volume itself. Therefore, high hopes are being placed on future demand.

As evidence, the 1980 production volume of peripheral and terminal equipment amounted to 688.1 billion yen (16.2% increase over the preceding year). Although the growth rate was lower than the 23.9 percent recorded in 1979 because the online terminals of banking networks have completed a cycle, a major growth is expected in the direction of distributed data processing in the future.

The large concentrated data processing system of the past is expected to be divided and broken down into a system which sends only the results to the center according to needs. This is expected to lead to the dispersal and installation of a large number of equipment such as the intelligent terminal and the memory device.

Among the personal terminal machines, the POS is expected to become very popular and provide diverse terminal service in the future.

On the other hand, in the input and output equipment of peripheral machines, there has been development of new products such as the kanji printer, input and output by voice and color display equipment. Among them a major change was seen in the external memory device.

At present the main items are magnetic tapes, disc and floppy. But in the future, there will be application of the large capacity Winchester disc and the video disc. The day is approaching toward realization of the application of optical type discs which read handwritten characters.

Export-Import Trends

In the export and import field, exports amounted to 83 billion yen in 1979 and 124.2 billion yen in 1980 which is an approximately 1.5-fold increase. Exports of main computer bodies were U.S. (1.4% increase), Australia (5.8 times), West Germany (86.3% increase), China (3.9 times) and South Korea (2.5 times). Exports of attached equipment were U.S. (36.2% increase), Australia (24.3% increase), West Germany (7.2% increase), South Korea (47.5% increase) and Britain (3.7 times).

In the import field, the 1979 total amounted to 118.2 billion yen and the 1980 figure was 165.8 billion yen. Japan imports 69 percent of main computer bodies from the U.S. There has been a sharp increase of computer imports from Brazil. The 1979 volume was two sets valued at 400,000 yen. But the import volume jumped to 110 sets in 1980 with a value of 7.4 billion yen. Most of the attached equipment are imported from the U.S. and Brazil.

Tasks in around 1985

The computer outlook for 1985 indicates cost performance improvement because of advances in the semi-conductor technological field and changes in the sales structure. The changes are (1) decrease of OEM sales and increase in the direct sales method to users, (2) decrease of CPU and memory sales and increase of overall system sales, and (3) a growing trend toward sales which raised the added value as a whole including software and maintenance service.

Export & Import Trends of Computer Installation

(Unit: million yen)

	Export	Import
1973	16,498	82,362
1974	24,576	114,155
1975	32,121	97,399
1976	43,655	100,098
1977	44,389	111,906
1978	71,699	83,499
1979	82,959	118,162
1980	124,227	165,763

As mentioned earlier, Japan's computer industry has developed to an advanced stage due to technical innovation. It is expected to grow rapidly in the future by meeting diverse needs.

Since Japan is a leading nation of the world in the field of computerization, it is expected to play an important role in the promotion of information-gathering activities in the ASEAN and other countries of Asia.

Current Trends in Asia

The following will be a report on the present state of the computer industry in the various countries of Asia and a look at Japan's future role in the area.

There is a rapid move toward computerization in Asia today. There has been a comparative and gradual advance in Singapore, Taiwan, Hong Kong and South Korea. The second group consists of the Philippines, Thailand, Indonesia and Malaysia.

The computer situation is a bit different in the case of China so it must be treated separately. China is the only country in Asia, besides Japan, to possess its own computer industry. At present China has about 3,000 computers in operation. They were virtually developed and built by China's own technology. Although most of the computers are not used in the business field, it appears that China has reached the period of computer development under its four-point modernization program.

On the other hand, all countries have been proceeding with rapid development of the information industry. It cannot be denied, however, that the development of computerization in every country of the area is now being hampered due to a severe lack of computer engineers in utilizing computers although all nations except China, plan to produce mini-computers, personal computers and micro-computers in the future.

To achieve this goal, every country is requesting Japan for cooperation or assistance, either official or unofficial, for training of engineers. As part of the program, the "Japan-Singapore Computer Training Center" (tentative name) is scheduled to start at the end of 1981 in Singapore. This has resulted from a request by the Singapore Government for Japanese cooperation to foster the growth of the software and data-processing industry as part of its policy to change the industrial structure from labor to a knowledge-centered pattern. This is the first case of its kind in Asia.

The Asian nations, excluding China, planning to produce computers in the future include South Korea and Taiwan although the production volume is expected to be small. In any event, it is presumed that the types to be produced will be limited to the category of mini-computers, personal computers and micro-computers.

Thailand, the Philippines and Malaysia should focus on utilization of computers rather than producing their own machines in judging the scope of their markets. In other words, they should put emphasis on training advanced engineers (such as system engineers or analysts) and developing software suitable to each country while hardware is imported from the advanced countries.

Center of International Computerization Cooperative (CICC), a non-profit organization of Japan, provides a system of one to three-month training courses for engineers on request from other countries and furnishes steady technical guidance and knowhow by sending consultants without charge to any government or government agency which intends to induce computers or to study computerization.

On the current computer situation in China, the nation is technologically behind the advanced nations. China has established the General State Administration of Computer Industry under the State Council in an effort to promote development of the computer industry in the country.

Computers now in production include medium-sized, small-sized, mini-computers and micro-computers while large-sized machines are presumed to be imported from the advanced countries.

The International Conference on the Fifth Generation Computer Closed

The International Conference on the Fifth Generation Computer, held in Tokyo by MITI and the Japan Information Processing Development Center, closed on October 22 after four days of meetings. The conference discussed computer development in the 1990s based on the MITI-initiated, ten-year, fifth generation computer development project. Scientists and computer engineers from the U.S.A., France, West Germany and Britain presented their advice and comments on the fifth generation computer during the conference, and applauded Japan for its initiation of the development project for the advanced computer.

On October 22, the final day of the international conference, a panel discussion on the socio-economic impact of the fifth generation computer was held to assess positive utilization of the advanced computer and prevention of any adverse effects.

Based on the experts' advice, MITI is going to modify its originally conceived R & D structure on fifth generation computers to facilitate participation of foreign governments and industry in the project.

As mentioned earlier, it is expected in the future that various business courses will increase and Chinese computerization will rapidly advance from the present situation where computers have been used mainly for scientific technology calculation and other special purposes.

There remain some problems, however, in applying software because China has its own peculiar form of systems and methods of operation. But since the "China Computer Technical Service Corporation" established in 1980 has been making strong efforts in software development, much progress is expected in the future.

The computer can be determined in terms of hardware by the degree of development in the parts, telecommunications and machinery industries which constitute the basis of the computer.

All Asian countries have agreed on the need to utilize computers and China, Taiwan and South Korea could become the producers of small-sized computers.

Japan's Roles

As an advanced country in computerization, what concrete role and plan does Japan have for Asian nations rushing development of computerization?

It is already known that the computer is more than just a merchandise as it is systematized and its technical innovation is progressing at a rapid speed.

It is most important for the steady and rapid growth of the computer industry to train engineers as well as personnel who can use computers without delay. For that purpose all countries have taken measures by setting up computer science courses and information processing courses in universities. But they alone are not enough to meet requirements for a rapid development of computerization.

The best method is to train competent engineers by establishing engineer training courses or centers with the cooperation of Japan which is technologically far ahead in this field.

The use of computers has shifted to the on-line system which is connected to the communication line, the real time system and the time sharing system and from this point it would be necessary to carry out a rapid consolidation of the infrastructure especially, for example, electric power, communication, etc.

It is believed that Japan can provide a variety of economic and technical cooperation because of its advancement in those fields. This would prove extremely significant in mutual relationships between Japan and Asian countries and result in a great deal of benefits in the form of international understanding with each other. ■

Fact-Finding Survey on Computer Installation

(Unit: Quantity/set, Amount/billion yen)

Size	Fiscal year	1975	1976	1977	1978	1979	1980
Large	Quantity	1,725	2,053	2,232	2,399	2,691	2,953
	Amount	1,104	1,332	1,518	1,683	1,929	2,163
Medium	Quantity	5,441	5,955	6,274	6,746	7,364	8,153
	Amount	587	627	6,628	717	778	838
Small	Quantity	7,337	9,327	11,618	14,160	17,033	20,529
	Amount	157	188	223	267	319	381
Very Small	Quantity	15,592	17,970	20,595	24,827	31,856	40,473
	Amount	96	112	127	152	191	240
Total	Quantity	30,095	35,305	40,719	48,132	58,944	72,108
	Amount	1,946	2,258	2,532	2,820	3,218	3,623
Increase of Installation (%)		21.5	16.0	12.1	11.4	14.1	12.6

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SCIENCE AND TECHNOLOGY

HIGHLIGHTS OF KEY PRODUCTS OF MAJOR COMPUTER MAKERS

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[Text]

Fujitsu Limited

Data Communications

Fujitsu, Japan's top maker of computers and a leading telecommunications equipment manufacturer, is also a pioneer in the development field of integrated information systems, where its state-of-the-art technologies in telecommunications and data processing can be uniquely meshed. Offering advanced products which meet the accelerating needs of the data communications field, the company has delivered many sophisticated systems to customers both domestic and overseas. In 1965 Fujitsu developed the first large-scale data communications network in Japan, the Ministry of Labor's nationwide online labor employment exchange system. This system has contributed materially by increasing employment opportunities in the nation.

In 1970, the company developed for Dai-Ichi Kangyo Bank a nationwide online banking network, which tied together more than 300 bank branches and main offices for real-time services. The company developed a similar system for the Federation of Bankers' Associations of Japan. This system tied together 87 member banks and their 7,400 branches into one nationwide network. The company is also a major contractor participating in the ongoing development of the national meteorological analysis and weather forecasting system, which, when completed, will deliver fast, accurate weather forecasts. In addition to these systems designed around large-scale computers, the company also has systems in which small-scale computers, carrier transmission equipment and telemetering/control equipment are integrated for remote monitoring and control in such varied applications as water management, electric power control, pollution monitoring, and building control and supervision. Meanwhile, to meet the growing needs of modern society, telemetering/control systems for more effective regional and urban fire protection/alarm systems and earthquake forecast experiments have been developed.

Telecommunications & Computers

Established in 1935, Fujitsu has long been a pioneer in the field of telecommunications. Today, with operations in over 100 different countries, Fujitsu is one of the world's leading telecommunications manufacturers. The company designs, produces and installs advanced electronic switching systems, coaxial cable systems, submarine coaxial cable systems, state-of-the-art microwave and optical fiber communications systems, and a broad range of assorted telecommunications equipment and components.

Domestically, Fujitsu has, in delivering a vast amount of telecommunications equipment to the Nippon Telegraph & Telephone Public Corporation (NTT), materially aided NTT in its successful installation of telecommunications networks covering the entire Japanese archipelago.

And with its state-of-the-art technology, which enables it to develop, manufacture, supply and install equipment and systems of unsurpassed efficiency and reliability, Fujitsu has been making a big name for itself overseas; it has completed major telecommunications projects in a number of countries throughout the world, many on a turn-key basis.

Fujitsu pioneered computer development in Japan. Since 1954, when it developed Japan's first commercial computer – the FACOM 100, a relay type – Fujitsu has led the computer industry in Japan. Backed up by sophisticated computer technology and components featuring outstanding reliability and performance, Fujitsu offers a full line of computers, ranging from the micro to the large; the large-scale FACOM "M" series of computers, the world's first all-LSI computer series, is finding an expanding market both at home and abroad.

Data Processing

In response to the ever more sophisticated demands of customers, the Computer Systems Group, based on its advanced technological capabilities and its long years of practical experience, has been developing ever newer, more efficient and effective computer systems.

The Group now offers a full range of computer systems, from micro and mini to large-scale computers, including the FACOM "M" series and "V" series of LSI computers, and the best-selling "8" series. The Group also offers a complete array of peripheral and terminal equipment, and a broad range of flexible and powerful operating systems and application programs designed to exploit all hardware capabilities to the fullest. The Fujitsu Network Architecture (FNA) concept answers the growing need in the data processing industry to relieve the central computer of trivial processing tasks, to reduce transmission costs in large network systems, and to enable efficient local site (distributed) processing.

General-purpose Computer Systems

The newly introduced "F" models in the FACOM M Series, the FACOM M-130F/140F/150F/160F/170F, are medium- to large-scale general-purpose computers designed for a wide variety of applications and for easy operation evey by non-specialists.

They make use of Fujitsu's most advanced LSI technologies, including our 64 Kbit RAMs, 6,000-gate-per-chip MOS-LSI's, etc. which results in greater price performance than former medium-scale models.

FACOM V Series

In addition to standard FACOM V Series functions such as data base, data communication, data entry, and data utility, the new FACOM V-830/850 computer offer extremely easy-to-use operation, including Japanese-language processing capability. It incorporates such outstanding technological advances as 10,000-gate-per-chip LSI's and 64 Kbit RAM's, making it an ideal work-station computer to meet the needs of the 1980's.

Japanese Processing Extended Feature (JEF)

With a view toward achieving full computer processing capability using the Japanese language, we have proceeded in developing a full line of hardware and software known as JEF, the Japanese Processing Extended Feature. JEF comprises an all-new array of system support, extending from basic software to application programs, which allows full Japanese language data processing with the same ease as conventional alphanumeric and Japanese *kana* processing.

Through the implementation of our newly developed JEF support system, processing capability on the one hand is extended to permit a free choice of alphanumeric, *kana*, or complete Japanese language processing (including *kanji* characters). In addition, tasks already being processed in alphanumerics or *kana* can easily be converted to full Japanese processing. And the use of full Japanese language processing also makes possible certain tasks formerly not suited to computer handling with only alphanumeric and *kana* processing modes.

Because of its numerous advantages, JEF is expected to considerably broaden the scope of computer usage in Japan over the next several years, and we thereby intend to accelerate our sales efforts accordingly. Fujitsu plans first to make JEF available for all FACOM M Series models, to be followed by use in small-scale computers and terminals.

Office Productivity Improvement

As the Japanese business world moves ever faster, organizations face a growing need for speedier decision making and response. There is an increasing awareness among chief executives in all kinds of sizes of organizations that office productivity must be improved.

The bulk of this improvement can be accomplished by four key office products: computers, electronic PBX's, facsimiles, and electronic Japanese language typewriters.

The "OASYS 100" is a revolutionary new Japanese language typewriter designed to handle a vast number of characters including Kanji. It is an epoch-making product that heralds dramatic boosts in office productivity.

Hitachi, Ltd.

In addition to developing the super-high-speed LSI, Hitachi has introduced a wide range of new computers. These include personal computer systems, minicomputers, the high-performance HITAC M- and L-Series, and the HIDIC control computer series. Effectively employing its rich store of software technology, Hitachi is making a wealth of contributions to social and economic advancement throughout the world.

Outstanding achievements in the application of its technology are seen in such examples as the seat reservation system of the Japan National Railways and quotation information systems for the securities business. HITAC customers are found in all fields of society.

Briefly introduced here are representative computers that occupy prominent places in the rich record of Hitachi performance: computers of the HITAC M Series, together with new and powerful computers of the HITAC L Series, developed chiefly for application to distributed processing systems, and minicomputers, and decentralized-type graphic data processing system.

HITAC M Series

HITAC M-280H (Air-cooled super-large-scale computer)
This newest, super-large-scale computer is high end model in the HITAC M Series. Employing high-density, super-high-speed LSIs and other latest technology, M-280Hs, designed for general use, offer the world's highest level of performance. They also play a central role, using high level software and high-speed, large-capacity peripherals, in large computer centers.

HITAC M-200H (Super-large-scale computer)
HITAC M-200H is also an air-cooled super-large computer with very high performance only next to HITAC M-280H in the HITAC M Series.

HITAC M-260H (Large-scale computer)
An advanced type processor, HITAC M-260H ranks next to HITAC M-200H and is fully abreast of current user needs. It assures high productivity in program development, is designed to be highly user-friendly, has expanded distributed network support function which permits users greater operational flexibility and has more fully developed functions for automatic operation of large-scale systems.

HITAC M-240H (Large-scale computer)
This large-scale computer is, despite its small size, distinguished by superior performance as the central computer of computer network systems, and large-scale data-base/ data communication systems.

HITAC M-160H (Large-to-medium-scale computer)
The M-160H is a large-scale computer that ranks next to the HITAC M-170 in performance. While it plays the main role in data-base/data communication systems, it is also capable of powerful performance when employed as the central unit for real-time processing, remote batch processing, conversational processing, and large-scale batch processing systems.

HITAC M-150H (Medium-scale computer)
The M-150H ranks next to the HITAC M-160H in the M Series and features a high cost-performance ratio among computers of this class. As a popular-type computer of the M Series, it is capable of serving in a wide range of fields and shares all the advantages of the M Series.

HITAC M-140H (Medium-scale computer)
Through the adoption of the latest technical know-how, both compactness and high level of performance have been realized in the M–140H medium-scale computer.

HITAC L-340 (Medium-to-small-scale computer)
As the top-ranking model of the L Series, the L-340 computer can be effectively employed in front-line sectors, where it exhibits its superior ability in such centralized processing as on-line, data-base, and batch processing, as well as in distributed processing.

HITAC L-330 (Small-scale computer)
The L-330 small computer makes possible the connection of display/printer units up to the maximum of 31. Despite its small size, it has functions that correspond to those of the L-340 and is ideal for use in data processing for medium-scale branch of business.

HITAC L-320/30H, 50H (Terminal computer)
As a single-/multi-station type terminal computer equipped with joint functions as a small business computer and intelligent terminal the L-320 is capable of billing, data entry, reporting, and Japanese word processing. Both types have the advantage of multi-job function that permits multi kinds of processing to be done simultaneously – two kinds of processing by single-station type and sixteen by multi-station type.

HITAC E-800 (Minicomputer)
This is a high-performance minicomputer in which full consideration is given to the module-adoption philosophy with regard to both hardware and software. Major emphasis is placed on ease of operation and alllowance for expandability to comply with the diversified needs of users. With the HITAC E-800, construction of systems, both small and large, best suited to the user's need is possible.

HITAC E-600 (Minicomputers)
In these models, such important features as excellent operational ability, simple mechanism, and capability of high-speed and high-accuracy processing have been embodied. As compact component minicomputers, they are provided with a rich supply of optional devices and peripheral equipment, and they allow easy building of systems best suited to each specific form of application.

HITAC G-730 (Distributed computer graphic system)

This system makes it possible to input, correct and edit graphic data efficiently in a conversational mode. Users are not required to prepare their programs for basic graphic data processing. To facilitate the preparation of NC tapes and other user programs using graphic information, a program interface is provided. A small-scale computer aided design (CAD)/manufacturing (CAM) system can be formed using only a G-730, and a large-scale total CAD/CAM system can be formed by connecting the G-730 to M Series computers using communication lines.

Mitsubishi Electric Corporation

MELCOM 80 Series
Small Business Computers

As the leading domestic maker of small business computers, Mitsubishi Electric takes particular pride in its MELCOM 80 Series. These highly efficient small business computers, the product of long and ample technological experience, have more than adequately proved their ability to fully satisfy market needs.

In principle, the design of the present series ranges from the simple data entry system to the full-fledged on-line system, thereby making it possible to construct a wide variety of systems and to comply with a wide variety of market demands. In short, the MELCOM 80 computers can be used at any time, by anyone, anywhere.

The series was initiated in January 1968 with the MELCOM 81, and new models have reached the market almost every year since then. By March 31 1981, no less than 18,000 units had been delivered.

Main Features

- **Designed above all for human operation**

  These computers are based on the direct-input system and are therefore easy to use. The layouts of both the operation panel and the system are based on concepts of human engineering.

- **Full range of software**

  The languages cover a wide range. For example, according to the model selected, COOL, or Customer-Oriented Optimum Language (machine language); assembler; COBOL, and the simpler PROGRESS are available.

- **Wide variety of operational functions**

  Operation is both easy and accurate because a wide variety of operational functions have been incorporated.

- **Large-capacity file employed**

  Since various magnetic disks and magnetic tapes are available, optimum file systems can always be compiled, and the capacity can be increased without difficulty.

- **Powerful on-line capacity**

  According to the required use, all types from the simple in-line system to the full-fledged on-line system can be assembled with ease. It goes without saying that the on-line system linking the various series is an effective one.

- **Wide variety of peripheral and terminal equipment**

  Peripheral and terminal equipment permitting easy assembly of optimum systems for all types of work is available.

- **Can be installed anywhere**

  There is no need for air-conditioning equipment and special power sources. The computers are compact and can be installed anywhere.

As the specifications in the table make clear, small business computers of the MELCOM 80 Series fully deserve their high reputation for versatility of practical use as well as for efficiency and ease of operation.

Nippon Electric Company, Ltd.

Nippon Electric Company, Ltd. (NEC) was inaugurated in 1899 as a manufacturer of telephone sets and telephone switching systems. Since then, it has expanded its business to such fields as telecommunications and hence to computers and electronic devices. Now it is one of Japan's leading general manufacturers of electronic equipment, and exports its products to over a hundred nations throughout the world.

The company has played a leading role in Japan's computer industry ever since it began research on computers in the mid-1950s.

NEC's development efforts have been based on the belief that computers would inevitably be connected with communications, and its business activities have been promoted along the line of this C & C (Computer and Communications) philosophy.

In exporting its computers, the company desires above all to contribute to the advancement of computerization in the countries to which they are sent. It has established a system that enables it to comply promptly with all demand, whether for terminal equipment, peripheral devices, or supler-large computers.

General-Purpose Computers

In the field of commercial computers, NEC is marketing the ACOS Series, which consists of a full line of computers ranging from small to super-large units. The series comprises 15 models: System 200 and System 250 (small computers); System 300, System 350, System 400 and System 450 (medium computers); System 500, System 550, System 600, System 650 and System 700 (large computers); and System 750, System 800, System 900 and System 1000 (super-large computers).

ACOS System 1000 is provided with a 64-megabyte main memory and a 128-kilobyte cache memory, and is the largest computer at present commercially available in the world.

The design concept prevailing throughout the ACOS Series is directed at (1) ease of operation, (2) on-line application, (3) use as a data base, and (4) development of high-level languages.

In accordance with these objectives, the ACOS Series features 1) a unified operating system, 2) powerful communication functions, and 3) new technology.

Small Business Computers (Office Computers)

NEC's office computer family – NEC System 20, System 50, System 100 and System 150 was aiming at high performance, compactness as well as low power consumption and high reliability.

NEC's office computer family is provided with APLIKA programs for each type of business and work, and it operates under the ITOS Operating System by which end users can make the program and data processing interact with the computer's guidance.

Minicomputers

NEC has developed various minicomputer models. Recently, NEC has developed a new multi service computer model NEC MS Series, covering a use for industrial control, communication control and distributed information-processing. Applying the technology of the NEC MS, NEC has lately developed the distributed information processor NEC N4700.

Peripherals and Terminals

By giving full play to its top-level world-wide technology, NEC offers products of high reliability in such fields as line printers, serial printers, magnetic-disk drives, OCR systems, CRT displays and floppy disk drive units. The company holds a large share of the domestic market for products developed to meet the particular needs of Japan–for example, Japanese Language Word Processor, OCR systems that reads handwritten characters and printers that print Chinese characters. In the fields of intelligent terminal equipment, NEC plays an active role as the leader, and its products enjoy a highly favorable reputation among their users.

In particular the serial printer that employs NEC's own head resembling a shuttlecock, and known as the Spin-writer, has won high praise in the U.S. and Western Europe.

Oki Electric Industry Co., Ltd.

Centennial 1881 – 1981

Oki Electric focuses a century of experience and acquired knowhow on advanced technologies spanning telecommunications, computers, terminal equipment, and electronic devices. These proven capabilities are at the forefront of the revolution in office automation, in systems which emphasize individual user convenience while increasing overall efficiency.

Oki Office Computers

Oki office computer systems are adaptable to fields ranging from data communications to business processing and scientific calculations. All use advanced software for efficient information handling, and custom designed software is also available.

The OKITAC System 50 consists of four different models, each model is designed to meet varying system costs and performance requirements. Its service capabilities exceed that of a medium-size general-purpose computer system.

The OKITAC System 9 series office computers offer extremely high performance at very low cost. Besides eliminating the need for trained operators and computer room facilities, these economical computers include a wide range of features which enable the computer to be operated by any office worker. With the Pen Touch series, data operations are further simplified as data can be entered by touching the desired block on a market sheet.

The IF800 line of personal computers optimize user convenience broad applicability. While sharing common hardware and software, Model 20 combines a floppy disc, visual display, printer and keyboard into one compact unit. Model 10 is the first computer in its class to include a built-in printer.

Word Processor

Oki's Word Editor Japanese-language word processor enables anyone in the office to compose, correct, edit, print, and store business documents promptly and with unprecedented ease. This system features floppy disc storage, Pen-touch data entry, and dot matrix printing.

OKIFAX Facsimile Transceivers

Oki Electric manufactures a fully array of facsimile equipment, from convenient desk-top models conforming to CCITT Group II standards to console models (G III) capable of transmitting A4 documents in less than 20 seconds. All models offer user-oriented convenience features along with extremely high reproduction quality.

Printers

OKI MT100 Teleprinter

The OKI MT100 fully electronic teleprinter is a future-oriented unit that features microprocessors, LSIs dot matrix printing, and the capability of bilingual operation. Designed to meet the diversifying requirements of telecommunications administrations and built to operate reliability in severe environments.

OKI DP-Series Line Printers

The OKI DP-Series line printers present mini-designers with the option of choosing exactly the right printer for a specific system application. Four printing speeds, from 125 to 300 LPM, are available to match system requirements. Font flexibility is superior to any comparable printer and the standard 96-character set can print in a variety of formats with optional character sets programmable to meet virtually any customers needs.

Microline Series Serial Printers

Microline Series printers offer the reliability and performance demanded by business for mini- and micro-system applications. Besides high printing quality, these units offer program-controlled font selection, block graphics, condensed printing, and self-testing facilities.

Toshiba Corporation

Development and Progress of Toshiba's Computers

Established in 1875, Toshiba has been pioneering the electronics industry in Japan over a century.

Morse telegraph was one of the first products provided by the company. A research and development laboratory was set up in 1918 and the company has ever since been involved in research and development activities.

It succeeded in developing vacuum tubes and said to have controlled the greater part of the market at that time.

Following that development, transistors were developed in 1948 and Toshiba began mass production of transistors.

With the slogan advocating "Greater concentration on man and his humanity and creation of new values and a richer, more healthy living environment," Toshiba started activities in intellectual creativity field at an early date for its future management policies.

In 1954, Japan's first computer "TAC" was jointly developed by the staff of Toshiba and Tokyo University and led Japan into the computer age.

In 1958, the TOSBAC series was introduced. Of the series, the TOSBAC 2100 was a general-purpose computer.

In 1961, minicomputers were developed.

In 1963, the TOSBAC 1100, small business computer (SBC) was developed.

In 1964, the TOSBAC 3400, a micro-programmable, high-performance intermediate-sized system was introduced. In the same year, the TOSBAC 7000, a process computer was also introduced.

In 1968, the TOSBAC 5400, a medium-scale, general-purpose system was developed. In 1970, the TOSBAC 5600, a large-scale, general-purpose system was introduced.

Further, in 1967 in the field of automatic, pattern information processing, automatic postal processing equipment, using hand-written and numerical recognition, was developed.

In 1971, Toshiba sold its first large-scale computer, the TOSBAC 5600, to the Agency of Industrial Science and Technology of MITI (Ministry of International Trade and Industry). The computer was used in the Agency's Electronic Technology Research Lab as main part of its pattern information processing system.

This is only one of many achievements Toshiba has accomplished over the years.

In 1973, one-chip microcomputers using VLSIs were developed.

With compactness and higher performance, SBC's have progressed over the years, and with the rapid development of office automation equipment, Toshiba has entered its second century of serving the business and public communities.

Data Processing Systems

Toshiba, with its superior technology, long experience and previous achievements, has led the way providing its customers with business computers, minicomputers, OCP (Optical Character Reader), and general-purpose and special peripheral equipment (terminals). Toshiba's performances and achievements have not yet been matched by anyone.

Thus with its total technology, developed over a century, its specialized know-how and its sophisticated systems engineering, Toshiba is working towards the creating of a better world for man to live in.

SBC (Small Business Computers)

Toshiba offers a wide series of computers with high performance capable of tabulation and multiple programming.

Toshiba introduced the industry's first Chinese character office computer and also developed office computers with word processing functions. Recently, office computers with OCRs were put on the market.

TOSBAC system 15 computer is a high-quality, economical office computer which is designed for easy operation.

In addition to its standard computers, Toshiba offers models with OCR functions and with touch-in key board.

TOSBAC system 65 is a large scale multi-purpose system with a data base facility. The system has many features including a COBOL function. Additional features are simultaneous parallel processing and a large-capacity data base and a VLSI memory.

Minicomputers

Toshiba offers minicomputers ranging from a 16-bit single board unit to a 32-bit architecture superminicomputers. These minicomputers play an integral part in on-line systems as standard office computers do. And Toshiba leads the way in producing these processing computers.

The Toshiba TOSBAC Micro 7 is a high-performance micro minicomputer with a 64-k byte memory, one-chip LSI processor 16-bit architecture on a compact single board.

They contribute to the compact, lightweight, high-quality features of control devices.

Further, the TOSBAC series 7 model 70 is Japan's first high-performance superminicomputer with a 32-bit architecture.

Toshiba's minicomputers play an important role in all industries in the fields of large-scale real time and exclusive controller.

They are greatly appreciated because of their high performance, high reliability and wide applications.

Terminal Systems

Terminals play an important role insofar as man-machine interfacing is concerned. In this field, making use of highly integrated technology, Toshiba is developing terminals to meet a variety of requirements in a multitude of fields.

Distributed Data Processing (DDP)

DDP work stations are also key products manufactured by Toshiba.

TOSBAC DP/8 is a highest-level multi-work station system especially designed for distributed data processing networks. It has large-capacity user memory and disc file built in.

High level language COBOL, data entry character ATLAS and a variety of other functions enable perfect distributed data processing configuring a well-balanced data system.

Data Entry System

The data entry system plays a very important role in data processings.

The RS3040 Series is a innovative data entry system using compact and economical floppy disks as a recording media.

The RS3041 Single Data Station is suitable for distributed or remote data entry system which is available for either on-line or off-line processing.

Equipped with two floppy disk drives, a keyboard, and a CRT display as a standard station, the RS3042 Dual Data Station is suitable for dual processing-type data entries.

The RS3047 Data Converter is used to transfer data recorded on floppy disks to magnetic tapes.

Word Processors

The word processor is a composition-writing machine. JW-10/2 Japanese word processor is a machine which clearly prints out both Japanese 'kanji' and 'kana' characters only by pushing 'kana' character keys as a composition out of one's mind.

JW-10/2 is also capable of memorizing prescribed form of a composition, picking up a necessary sample sentence, and partly correcting or adding words or sentences as desired.

EW-100 is specially designed for English word processor. The word processor is indispensable for future office business in quality print and editing and correcting functions.

OCRs

Toshiba also offers OCRs ranging from economy type models for office computer input to ultra high-speed type models which can recognize hand-writing 'kana' numbers of 500 characters a second.

OCR-V395 is a high-performance version of OCR which can read a variety type of hand writing letters combined with numbers, English letters, kana characters and special letters and marks. OCRs greatly reduce the input costs.

CSO: 4120/104

SCIENCE AND TECHNOLOGY

LONG-TERM PLANNING FOR INDUSTRIAL TECHNOLOGY REPORTED

Tokyo DIGEST OF JAPANESE INDUSTRY & TECHNOLOGY in English No 166, 1981 pp 89-94

[Text] *The Agency of Industrial Science and Technology (AIST) established the Long-term Planning Study Group for Industrial Technology Development, a private advisory committee under the Director-General of AIST in September 1977. Since then, it has performed a series of new strategic research and analysis on technical development problems essential to the development of the Japanese industrial community and surveys necessary for formation of industrial technology policy over the past four years.*

In August 1980, it made an interim report on research and development (R & D) of basic techniques necessary for Japanese industries to tackle immediately.

On the basis of this report, AIST initiated in 1981 the "Basic Technique R & D System for Next Generation Industries" in an attempt to launch development of basic technologies of industries after 1990 through government application of research vitality developed by the private sector.

In addition, this study group held its final meeting on October 9, 1981 and completed a report on "Long-term Planning for Industrial Technology Development – Toward New Research and Development" which is aimed at proceeding with comprehensive and effective R & D as well as future direction of R & D planning until the Year 2000.

This report should be regarded as an indicator of Japan's R & D in the future since it is a report prepared by the AIST Director's private advisory organ.

Preface

Since the 1980s, various international conditions surrounding Japan have become complicated and diversified and the limitations of natural resources and energy have aggravated. It has therefore, become more important for Japan to make peaceful efforts to cope with the prevailing situation.

Technology is an effective and useful method for the above requirements and Japan should bear this responsibility as a peace seeking nation and at the same time as an economic power in order to positively deal with these conditions.

Japan has been a leader of the world's technological innovations because of its experience in peaceful use of past technologies. It is hoped that Japan will exert its utmost efforts to make peaceful use of technology on a universal basis.

Agency of Industrial Science & Technology

The Agency of Industrial Science and Technology, an attached organ of MITI, was established in 1948 to administer Japan's use of technology, thereby promoting the development of natural resources, the modernization of production methods, the upgrading of production technology, the standardization of industry, and the subsidization and encouragement of research and development in Japan's private sector. The Agency was also charged with the setting up of a system for comprehensive research and experimentation in the areas of mining and industrial technology in order to implement the above policies.

Note: Please see MITI HANDBOOK 81/82 on further details. The handbook can be obtained by sending an attached sheet (see page 46) to our sales department.

Japan should be the first in the world to further promote technical development in an effort to realize the primary mission that technology exists for the sake of human happiness.

With this point in mind, we mentioned the importance of "basic technology" as an R & D task in an interim report issued in August 1980 which was followed by a report on "Basic Technology R & D System for Next Generation Industries" in 1981. This was the final report which focused on the operational system of R & D.

Out of the understanding that Japanese technical development power should make greater efforts in the future although its technical standard ranks high internationally in terms of production technology, this report has proposed the following three points:

(1) To promote independent technical development by substantiating basic research,

(2) To encourage private enterprises to make practical use of universities and national research institutes by becoming the main force in research and development,

(3) To develop the technology of required industries, it is necessary to advance under the premise of carrying out joint research on an international basis or technological transfer.

Framework of the Report

As mentioned earlier, research and development contribute to the development of industries. The current situation of research and development can be analyzed from the two aspects of R & D activities and their resultant technical standards.

Current Status of Japan's R & D Activities

On R & D Cost

(1) Japanese R & D cost total during FY 1979 surpassed four trillion yen (currently about 220 yen level to the dollar), ranking second in scope to the U.S. in the free world (hereafter, every international comparison will be made in the realm of the free world). If observed from the GNP ratio, Japanese R & D cost remains at a lower level of 1.83 percent than that of the advanced nations.

(2) R & D activities cover a wide range of performances including the acquisition of scientific knowledge and its industrialization. If these activities are classified into three stages of "basic," "application" and "development"

studies. Japanese R & D activities can be characterized as comparatively more oriented to development study than to the basic one.

In other words, Japan's R & D cost total ranks second to the U.S. among the five major countries while its basic research cost stands third after West Germany, with an extremely smaller amount than U.S. investments.

(3) In addition, Japan's investments in R & D cost have increased by industry in the fields of electric machinery, chemical and transportation machinery (such as automobiles) while in Western nations, the aircraft field, besides the above, has characteristically displayed a higher weight than in Japan.

Number of Researchers

(1) The number of researchers, a key factor for R & D activities in line with R & D cost, exceeded 300,000 in Japan as of April 1, 1980, ranking second to the U.S. in size and standing almost equal to the U.S. and much higher than other Western nations in terms of the number of researchers per 10,000 population capita.

In this light, Japanese manpower for R & D can be considered rather abundant.

(2) However, Japanese R & D cost per researcher amounted to somewhere around half of the Western nations, proving that Japanese researchers are not always blessed with sufficient funds.

(3) Japanese composition ratio for the number of researchers by industry (Table 1) stands at the same level as the Western nations in the fields of electric machinery and chemical industries and ranks higher in the sectors of raw material industries such as steel and ceramics.

It is characteristic in the Western countries that the ratio of the transportation machinery industry including aircraft is high in addition to the electric machinery and chemical industries.

Japanese Technical Standards

(1) After World War II, Japan has been endeavoring to absorb and adopt the overseas advanced technologies of the Western developed nations by positively inducing them with an aim of catching up with the U.S. and European nations.

The Japanese patent application ratio among foreign patent applications in major countries has increased twofold from the seven percent level to 14 percent during the 1970s, proving that Japanese technical standards have advanced rapidly from an international point of view.

Japanese R & D power has improved in the major indexes of R & D standards: R & D cost, the number of researchers, revolutionary technical developments and overseas patent applications and technological trade when compared with the U.S. and West Germany at two points consisting of the latter halves of the 1960s and 1970s.

In other words, it can be considered to have reached almost the same level of West Germany although still behind the U.S. standard during the second half of the 1970s.

(2) On the other hand, concerning technical differences with overseas corporations (see Table 2), more than half of Japanese private enterprises in the steel, ceramics and precision machinery industries assess by themselves that their technology is more advanced than foreign companies while most of the other industries evaluate Japanese techniques as on the same level as overseas enterprises.

These observations have accrued from the fact that the international competitive power of Japanese manufactured goods has grown stronger in general.

In other words, the current situation of trade balance for major items certainly shows that manufactured goods trade such as steel, ceramics, precision machinery and electric machinery has marked a surplus, indicating that the international competitiveness of products in the above fields has increased.

However, it has been found that the balance of technical trade, an index of technical standards, has suggested that the technical base on which these industries lie has an unexpected weak spot. All of them except steel have recorded a deficit in their balance of technical trade unlike manufactured goods trading. Particularly, it merits special attention that the balance of technical trade is rated low in fields of strong international competitiveness such as electronic components including semi-conductors (0.16%), electronic application equipment (0.08%) and communications equipment (0.43%).

It is generally considered that technical standards as indicated by the balance of manufactured goods trade mainly represents the reduction of production cost through mass production and automation as well as the level of cost-oriented production techniques through quality control while these indicated in the balance of technical trade primarily show patent-related basic technology.

It can be safely said that a deficit in the balance of technical trade despite a surplus in manufactured goods trade means that Japanese technical standards still remain far behind foreign countries despite the fact that foreign makers possess the basic patents of semi-conductors, computers, etc.

On the other hand, newly-contracted technical trade shows that the balance of technical trade has generally been improving and the ratio of Japanese overseas patent applications has been increasing.

Therefore, it seems that Japanese capability in original techniques or invention of new technology is gradually advancing.

Direction of Research and Development

Based on the current situation of Japanese R & D and technical standards, the direction of research and development in the future will be discussed in this chapter from the two aspects of "expectations on technology" and "direction of technical advances."

Expectations on Technology

Japan has now developed into an economic power occupying about 10 percent of the world economy in terms of GNP as a result of its efforts of reconstruction after the war, subsequent economic growth and smooth transition into secure economic growth with the oil crisis as a turning point.

It is, however, necessary for Japan to cope with various problems at home including such diversified and sophisticated needs of Japanese people to stabilize national life toward an aged society and to ensure community formation while the external field involves many issues like trade friction and energy in a stringent international climate.

Accordingly, the Industrial Structure Council's report, "International Trade and Industry Policy in the 1980s" submitted in March 1980 has carried the following three objectives as a new national goal not only for the 1980s but for the 1990s:

(1) International contribution as an "economic super power",
(2) Overcoming of limitations as a "poor resources country", and
(3) Reconciliation of "vitality" and "latitude."

To achieve these three objectives, extremely great expectations will be placed on technology, an expectation that technology constitutes a driving force for industrial development and technology will probably bring forth a new culture in view of the fact that our life pattern has been changing framatically due to the revolutionary development of techniques such as mechatronics.

In this basic light, our study group has taken up the following three expectations, namely "Approach to Human Being," "Overcoming Resource and Energy Limitations" and "Expansion of Activity Range" as an expectation on Japanese technology.

Approach toward Human Beings

From the time when mankind started using tools, fire and stone implements down to the present age of plastics and electronics, technology has maintained a close existence with human beings as a means to realize human dreams and desires.

"Approach toward Human Beings" mentioned above means that technology should be made more useful than today for solution of various problems concerning human beings themselves. In other words, it covers diverse techniques not only as a supplement to human activities or as a production tool to relieve men from simple or dangerous work through industrial robots, office automation and artificial intelligence devices, but also as a substitute to human organic functions such as artificial hearts and other medical support appliances.

In addition, there remains a possibility that biogenetics which is a very fundamental science to make clear the generation and development of living organisms will bring about a new demand for technical innovation in the future.

It is essential to develop techniques meeting the above requirements with due consideration to the inside of human beings such as humanity and sentiment.

As a result, "vitality" and "latitude" will be born in our society.

Overcoming Resource and Energy Limitations

It is inevitable for Japan, a poor resource country, to overcome the limitations of resources and energy from the standpoint of national security and at the same time it is necessary to do so as a global task from the point of international responsibility as an economic power.

There will, therefore, be a variety of technologies to be developed including oil-substitute energy-related techniques with nuclear power, coal and solar energy, a bioreactor technique through biotechnology, energy conservation-related techniques through new equipment with new materials, natural resources-mining and developing techniques for oil and minerals and biomass utilization techniques as industrial materials, food or energy resources.

Expansion of Activity Range

Technology has continuously expanded the activity and utilization range of human beings from the past. For instance, the airplane has directed human eyes toward the sky, relieving them from terrestrial restraints.

Expanded activity range through the utilization of outer space including international communications, meterological observations, resources surveys and space plants by means of man-made satellites would bring forth multifarious benefits such as expedition of information delivery, expansion of information volume and production of new type materials, all of which are not available solely on the earth.

There are still undeveloped areas in the ocean which occupy about three-fourths of the earth. For example, the search and drilling for oil which is the major source of energy are shifting from land to the continental shelf. Furthermore, the search is advancing deeper down the continental shelf. There has also been exploration of the deep sea bottom to explore and mine manganese nodules and other minerals.

The expansion of the field of technical research is expanding to the ocean and space with the launching of space rockets. This will enable mankind to establish new options. Japan should make positive efforts to participate in the challenge to expand mankind's frontier because this will not only make international contributions but will also provide "vitality" and "latitude" to our society. ■

Note. This translation into English is tentative. Accordingly, detail and accurate inquiries on the report should be directed to the Agency. – Editor

CSO: 4120/104

PRESENT STATUS OF OFFSHORE OIL, GAS EXPLORATION, DEVELOPMENT ACTIVITIES

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 48, 30 Nov 81 pp 7,8

[Text]

New Japan Sea Exploration Co., Ltd.

The company was established on June 25, 1976, to inherit the exploration and production activities in the Japan Sea, which had been undertaken until then under the name of Idemitsu Exploration Co. (Japan Sea) Ltd., but excluding the exploration and development activities (including the oil & gas production from the Aga Field off Niigata Prefecture) currently being carried out jointly by Japex Offshore, Idemitsu Oil Development and Amoco Japan Exploration (JPEW, November 23 - p.15).

The New Japan Sea Exploration's exploration is currently being carried out jointly with Amoco on a 50:50 basis. A total of thirteen exploratory wells (including one well drilled off Naoetsu North, Niigata Prefecture, under the Ministry of International Trade and Industry stratigraphic drilling program) have been drilled off Akita and Niigata Prefectures during the period since July 1973 till the present, and one well is being drilled off Niigata Prefecture. One well (Off Aga North IA-3 Well) of the above 13 was successful, testing 4,000 b/d of oil production. An appraisal well (Off Aga North IA-4 Well) is being drilled in this field and two more appraisal wells will be drilled by March 1982.

The company was capitalized at ¥11,790 million as of July 1, 1981, with the following two shareholders owning the equity capital as follows:

	¥ Million	% Share
Idemitsu Oil Development Co.	7,065	59.9
Japan National Oil Corp.	4,725	40.1
	11,790	100.0

Company	Location	Drilling Spudded/Ended	Rig Released	Total Depth Meters	 Feet	Results	Rig Used
New Japan Sea E[illegible]/Amoco (50:50)							
. Off Aga North IA-1	139°09'54"E 38°07'52"N	July 11, 1973 Aug.20, 1973	Sept.13, 1973	1.599	5,245	Dry	Hakuryu #2

Company	Location	Drilling	Rig Released	Total Depth		Results	Rig Used
		Spudded/Ended		Meters	Feet		
. Off Aga Northwest IA-1	139°07'55"E 38°16'11"N	Sept.15, 1973 Sept.30, 1973	Oct.3, 1973	2,565	8,413	Dry	Hakuryu #2
. Off Aga North IA-2	139°10'03"E 38°08'45"N	Oct.4, 1973 Nov.29, 1973	Jan.2, 1974	2,233	7,324	Dry	Hakuryu #2
. Off Honjo IA-1	139°51'10"E 39°24'43"N	Jan.5, 1974 Feb.19, 1974	Mar.26, 1974	3,481	11,418	Dry	Hakuryu #2
. Off Honjo IA-2	139°51'45"E 39°22'57"N	June 6, 1974 June 27, 1974	June 28, 1974	2,662	8,731	Dry	Hakuryu #2
. Off Naoetsu IA-1	138°05'19"E 37°17'36"N	July 13, 1974 Aug.21, 1974	Sept.1, 1974	3,352	10,995	Dry	Hakuryu #2
. Off Aga West IA-1	139°06'35"E 38°11'46"N	Sept.12, 1976 Oct.21, 1976	Nov.17, 1976	3,050	10,004	Dry	Hakuryu #3
. Off Murakami IA-1	139°18'47"E 38°19'48"N	Nov.19, 1976 Jan.28, 1977	Feb.9, 1977	3,662	12,011	Dry	Hakuryu #3
. Off Kashiwazaki IA-1	138°30'39"E 37°30'14"N	June 3, 1977 Aug.23, 1977	Sept.28, 1977	3,774	12,379	Dry	Hakuryu #3
. Off Teradomari IA-1	138°40'26"E 37°42'14"N	Nov.26, 1978 Feb.14, 1979	Mar.10, 1979	3,823	12,539	Dry	Hakuryu #5
. Off Honjo IA-3	139°51'17"E 39°25'58"N	Mar.22, 1980 May 1, 1980	May 19, 1980	2,950	9,676	Dry	Hakuryu #2
. Off Aga North IA-3	139°09'25"E 38°06'50"N	Mar.23, 1981 Apr.23, 1981	June 8, 1981	2,200	7,216	Successful	Hakuryu #2
. Off Naoetsu North (MITI stratigraphic drilling)	138°10'46"E 37°23'28"N	June 23, 1981 Sept.16, 1981	Sept.26, 1981	4,509	14,790	Dry	Hakuryu #5
. Off Aga North IA-4	139°10'12"E 38°07'11"N	Oct.29, 1981		1,700 (target)	5,576		Hakuryu #2

Japex Hokkai Co., Ltd.

The company was established on September 21, 1976, as a subsidiary of Japan Petroleum Exploration Co. (Japex) to promote the exploration and development in an area off Tomakomai, Hokkaido. A total of eight exploratory wells have been drilled during the period from November 1976 through early this year, with one well (Off Yufutsu B-2 Well) confirming promising gas deposits at a depth of around 2,900 meters (9,510 ft).

The company was capitalized at ¥7,506 million as of July 1, 1981, with the following two shareholders owning the equity capital as follows:

	¥ Million	% Share
Japan Petroleum Exploration Co.	4,456	59.4
Japan National Oil Corp.	3,050	40.6
	7,506	100.0

Company	Location	Drilling	Rig Released	Total Depth		Results	Rig Used
		Spudded/Ended		Meters	Feet		
Japex Hokkai							
. Off Yufutsu B#1	141°47'16"E 42°28'45"N	Nov.5, 1976 Apr.18, 1977	Apr.26, 1977	4,030	13,218	Dry	Hakuryu #4
. Off Mukawa A#1	141°56'41"E 42°30'33"N	Apr.28, 1977 Aug.18, 1977	Aug.28, 1977	3,802	12,471	Dry	Hakuryu #4

. Off Tomakomai A#1	141°38'30"E 42°33'35"N	Oct.28, 1977 Jan.18, 1978	Feb.16, 1978	3,503	11,490	Dry	Hakuryu #4
. Off Shiraoi #1	141°26'07"E 42°30'56"N	July 1, 1978 Aug.26, 1978	Aug.30, 1978	3,500	11,480	Dry	Hakuryu #2
. Off Tomakomai C#1	141°38'32"E 42°29'46"N	Sept.1, 1978 Oct.31, 1978	Nov.8, 1978	3,005	9,856	Dry	Hakuryu #2
. Off Yufutsu B#2	141°46'24"E 42°27'07"N	Nov.22, 1978 Jan.25, 1979	Mar.9, 1979	3,200	10,496	Successful	Hakuryu #2
. Off Yufutsu B#3	141°46'06"E 42°26'30"N	Nov.16, 1979 Feb.7, 1980	Feb.12, 1980	3,823	12,539	Dry	Hakuryu #2
. Off Yufutsu B#4	141°46'09"E 42°27'55"N	Nov.11, 1980 Jan.19, 1981	Feb.26, 1981	3,583	11,752	Dry	Hakuryu #2

CSO: 4120/106

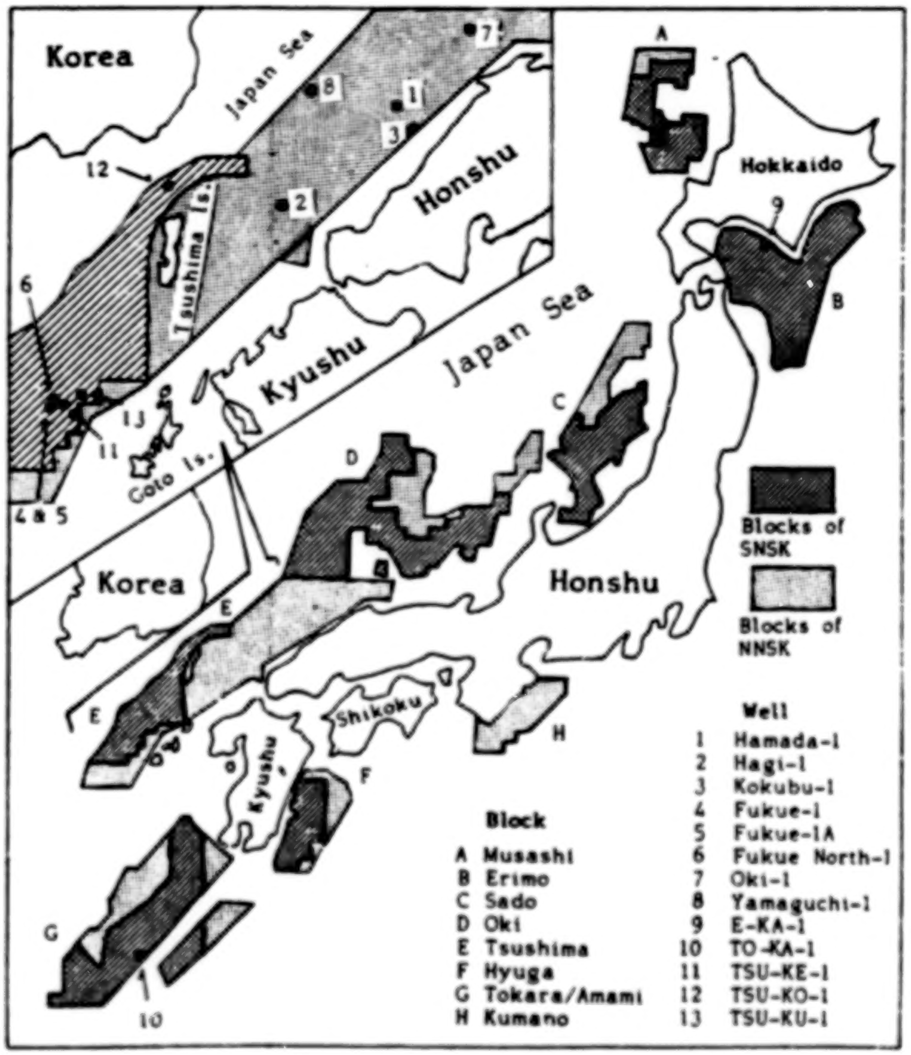
SNSK OFFSHORE HOLDINGS, ACTIVITIES DESCRIBED

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 16 No 49, 7 Dec 81 pp 8,9

[Text]

Nishi Nihon Sekiyu Kaihatsu K.K./Shin Nishi Nihon Sekiyu Kaihatsu K.K.

The company was originally established on June 27, 1967, under the name of Nishi Nihon Sekiyu Kaihatsu (abbreviated as NNSK and translated as West Japan Oil Development Co.) as a joint venture of Shell Kosan (a wholly-owned subsidiary of the Shell Petroleum Co.) and the Mitsubishi group of companies to undertake exploration in several blocks on the Japanese continental shelf on a 50:50 basis. NNSK drilled eight exploratory wells in the Tsushima Block, off West Japan, but all of them were dry.



In order to introduce government funds through the Japan National Oil Corp. (JNOC) for further exploration, Shell and the Mitsubishi group of companies established a separate company, Shin Nishi Nihon Sekiyu Kaihatsu K.K. (SNSK). SNSK inherited from NNSK approximately 235,000 km^2 (90,730 sq mi), with NNSK relinquishing part of the originally held areas totaling 366,000 km^2. NNSK was dissolved on December 14, 1979.

SNSK drilled five exploratory wells without any promising results -- 3 in the Tsushima Block; one in the Tokara/Amami Block; one in the Erimo Block -- during the period from October 1977 through February 1980. Effective April 1, 1981, SNSK commissioned its business operation as well as technical review of the results of exploratory wells drilled thus far by NNSK/SNSK to Mitsubishi Petroleum Development Co. which represents the interests of the Mitsubishi group of companies holding equity interests in SNSK.

The areas presently held by SNSK comprise the following seven blocks (see map):

Block	Km²
Tokara/Amami	45,000
Hyuga	14,000
Tsushima	14,000
Oki	59,000
Sado	27,000
Erimo	51,000
Musashi	25,000
	235,000

SNSK was capitalized at ¥11,681 million ($53 million) as of July 1, 1981, with the following shareholders owning the equity capital as follows:

	¥ Million	% Share
Japan National Oil Corp.	4,555	39.00
Shell Kosan K.K.	3,563	30.50
Mitsubishi Corp.	1,353.94	11.59
Mitsubishi Heavy Industries, Ltd.	712.6	6.10
Mitsubishi Mining & Cement Co.	712.6	6.10
Mitsubishi Electric Corp.	356.3	3.05
Mitsubishi Chemical Industries, Ltd.	213.78	1.83
Tokyo Marine & Fire Insurance Co.	213.78	1.83
	11,681.00	100.00

Company	Location	Drilling Spudded/Ended	Rig Released	Total Depth Meters	Total Depth Feet	Results	Rig Used
Nishi Nihon Sekiyu Kaihatsu (Mitsubishi/Shell joint venture on a 50:50 basis)							
. Hamada #1	131°47'12"E 35°18'56"N	Feb.27, 1971 Aug.11, 1971	Sept.4, 1971	3,343	10,965	Dry	Ocean Prospector
. Hagi #1	130°32'54"E 34°40'12"N	Sept.9, 1971 Dec.5, 1971	Dec.13, 1971	3,462	11,355	Dry	Ocean Prospector
. Kokubu #1	131°52'22"E 35°07'56"N	Dec.18, 1971 Feb.21, 1972	Apr.16, 1972	4,009	13,150	Dry	Ocean Prospector
. Fukue #1	128°04'55"E 33°14'28"N	Apr.30, 1972 Jul.16, 1972	Sept.6, 1972	4,068	13,343	Dry	Ocean Prospector
. Fukue #1A	128°04'56"E 33°14'29"N	Sept.7, 1972 Oct.2, 1972	Nov.8, 1972	2,228	7,308	Dry	Ocean Prospector
. Fukue North #1	128°06'31"E 33°19'25"N	Mar.12, 1973 Apr.15, 1973	Apr.27, 1973	2,967	9,732	Dry	Ocean Prospector

. Oki #1	132°42'50"E 35°48'17"N	May 8, 1973 Jun.3, 1973	Jun.6, 1973	2,050	6,724	Dry	Ocean Prospector
. Yamaguchi #1	130°57'30"E 35°33'02"N	Jun.9, 1973 Jul.11, 1973	Jul.17, 1973	2,502	8,207	Dry	Ocean Prospector

Shin Nishi Nihon Sekiyu Kaihatsu (Mitsubishi/Shell joint venture on a 50:50 basis)

. E-KA #1 (in "Erimo" block)	142°25'54"E 42°10'35"N	Oct.20, 1977 Dec.24, 1977	Jan.1, 1978	3,967	13,012	Dry	Hakuryu #3
. TO-KA #1 (in "Tokara-Amami" block)	128°55'29"E 29°16'22"N	Jan.17, 1978 Mar.3, 1978	Mar.13, 1978	2,985	9,791	Dry	Hakuryu #3
. TSU-KE #1 (in "Tsushima" block)	128°08'07"E 33°16'37"N	Oct.3, 1978 Nov.18, 1978	Nov.28, 1978	3,124	10,249	Dry	Hakuryu #3
. TSU-KO #1 (in "Tsushima" block)	129°24'20"E 34°56'37"N	Dec.5, 1978 Jan.16, 1979	Jan.23, 1979	3,420	11,218	Dry	Hakuryu #3
. TSU-KU #1 (in "Tsushima" block)	128°20'43"E 33°18'05"N	Nov.3, 1979 Feb.13, 1980	Feb.28, 1980	4,117	13,504	Dry	Hakuryu #5

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